

STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF CONSERVATION  
DIVISION OF FORESTRY

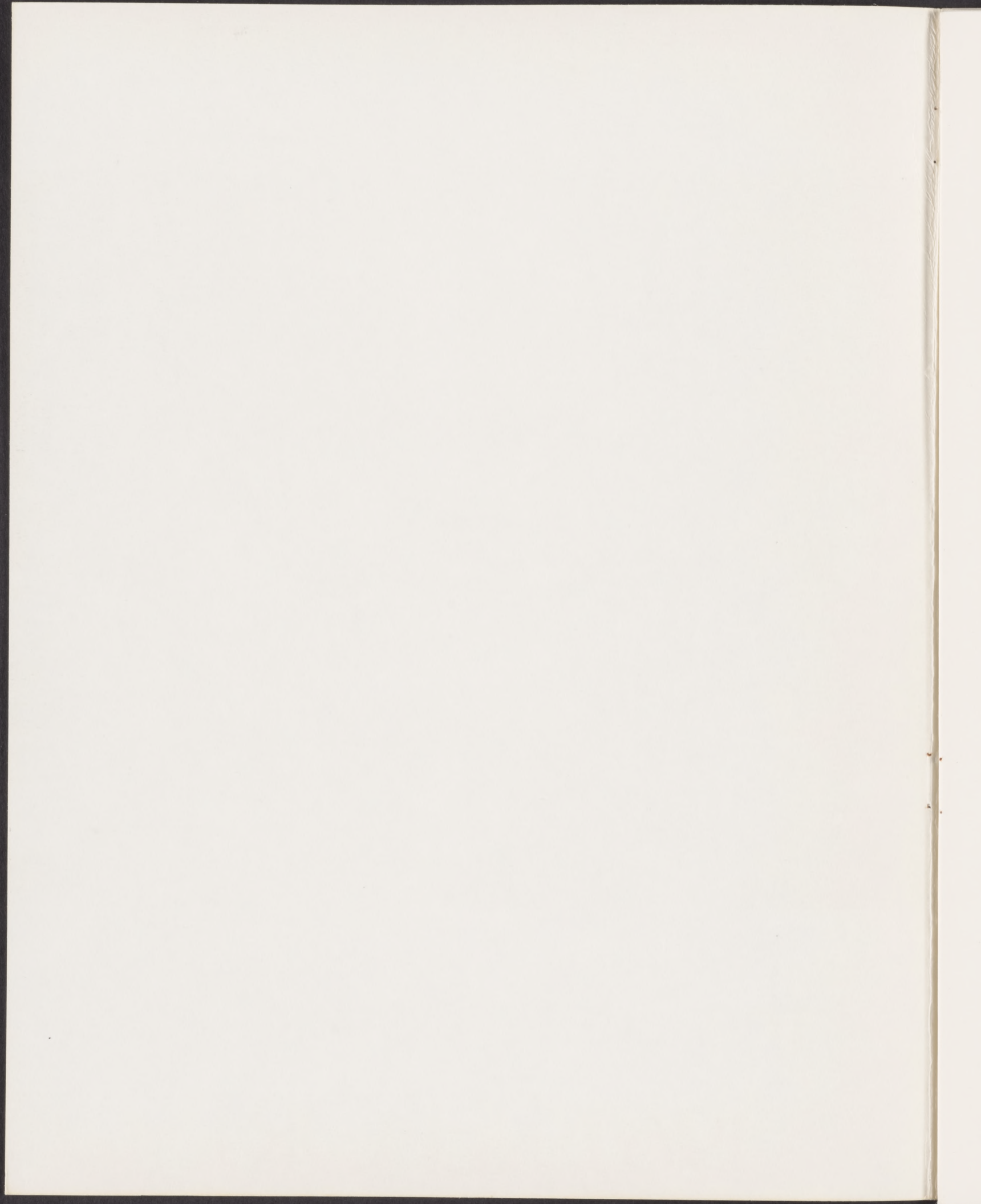
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# the State Forester's 1967 REPORT





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*Governor*

NORMAN B. LIVERMORE, JR.  
*Administrator*  
*The Resources Agency*

JAMES G. STEARNS  
*Director*  
*Department of Conservation*

## The STATE FORESTER'S 1967 REPORT



F. H. RAYMOND  
*State Forester*

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SACRAMENTO, CALIFORNIA

1968

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JAMES D. STEVENS  
Lieutenant Governor  
Secretary of the Board

WILLIAM S. GORDON, JR.  
Secretary  
The Department

# THE STATE FORESTER'S 1987 REPORT



R. H. BARNARD  
Deputy Forester

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SACRAMENTO, CALIFORNIA

1987



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## THE STATE BOARD OF FORESTRY

The State Board of Forestry, consisting of seven members, is appointed by the Governor. The Board represents the State's interest in acquisition and management of state forests, and in federal land matters related to forestry. Protection of the state's interest in forest resources on private lands is also a responsibility of the Board. The Board determines and maintains an adequate forest policy for the state, and establishes general policies for guidance of the State Forester in administration of the Division of Forestry.

In 1967 the Board held twelve regular meetings, in eleven different months. Attendance at hearings, conferences, and meetings of committees or other organizations concerned with natural resources problems required considerable amounts of time, in addition to participation in regular meetings. Several members of the Board took part in the meeting of the National Association of State Foresters, held in Sacramento in October. Various members of the Board served on timber maturity boards, established under the State constitution to determine maturity of timber on cut-over lands.

A topic of primary interest to the Board was legislation proposed to amend the Forest Practice Act; considerable time was devoted to this subject during the first half of the year. Another item of major concern was progress of the Division of Forestry budget through the legislative session. In addition to these matters, public hearings were held and amendments adopted to Forest Practice Rules for both the Redwood Forest District and the North Sierra Pine Forest District. Hearings were held and 14 alternate plans, proposed for timber harvesting and reforestation operations by private timberland owners, were approved. Attention was given to activity of the Governor's Survey Team on Efficiency and Cost Control, and to the Public Land Law Review Commission; proposed legislation to establish a national redwood park was given consideration. A comprehensive review of the forest, range, and watershed management program of the Division of Forestry was held in November; the Fire Prevention Program was given a similar review in December. Plans were made to review all other programs of the Division of Forestry early in 1968.

Duties of the Board of Forestry require its members to have knowledge of forest, range, and watershed conditions throughout the state. To keep abreast of current situations the Board periodically makes field trips to different parts of the state, to examine various aspects of wildland problems at first-hand. The Board included four such field-study trips in their regular meetings in 1967.

In June, following a regular meeting in Ukiah on June 1, the Board visited Jackson State Forest. They

observed effects of logging on fish spawning areas in coastal streams; effect of recent logging on natural beauty; firebreaks designed to enhance natural beauty; and examples of multiple use management on the Forest. The Board found that after seven decades of logging, much of it an attempt to "clear" the forest—where growing conditions are typical of the coastal redwood country—Jackson State Forest is producing sufficient growth to permit an annual harvest of more than 30 million board feet of timber, and never reduce the current supply of forest products. Through reasonable management and logging practices the natural beauty of the Forest can be enhanced without reducing productivity, or use of the area by the public.

Later in June the Board toured the air attack facility at Ramona Airport, in San Diego County; they visited Cuyamaca Conservation Camp, and inspected the new site for Minnewawa Conservation Camp. They participated in dedication of new headquarters facilities for San Diego Ranger Unit at Monte Vista on June 22.

Preceding the regular meeting in August the Board visited the Challenge Experimental Forest of the U.S. Forest Service, in Butte County. They observed research on logging methods and practices for reducing accumulations of logging slash. On the same trip, on lands of Soper-Wheeler Company, they observed salvage logging operations; viewed invasion of tan-oak in a selectively cut stand; and inspected plantations of varying ages established on lands where logging slash was burned after clear cutting.

In September, the Board toured fire control facilities of the Los Angeles County Fire Department, considered wildland fire control problems, and studied forest and watershed conditions of wildlands adjacent to major metropolitan areas of Los Angeles County.

The Board's Range Improvement Advisory Committee was reorganized, new objectives established, and other steps taken to revitalize this advisory group. Reports and recommendations were made to the Board from time to time by several of its own committees, and by a number of public groups as well. The California Forest Pest Control Action Council presented a special program "Forests, Pests, and Pesticides." Reports were made on activities of the San Diego Citizens Watershed Resources Commission; and on impacts of use on forest watersheds, and relationships to protection.

There was one change in membership of the Board in 1966: Mr. Ray Crane was appointed to replace Mr. E. P. Ivory, whose term had expired. On April 27, 1967, a short time after his term on the Board ended, Mr. Ivory passed away.



## EXECUTIVE

### *The Year in Review*

State Forester Raymond and Chief Deputy Moran both devoted considerable time and attention to the Governor's Survey on Efficiency and Cost Control. This survey group, comprised of men with a wide variety of backgrounds in industry, was authorized by the Governor early in the year to scrutinize closely the methods of operation and cost control measures employed by each agency of state government. A detailed report with recommendations for future action, or modifications of each agency's organizational structure was the end product of the work of this task force. Many conferences and several extended field surveys were included in evaluation of the Division's operations and programs by this group during the first few months of the year. Of necessity, assistance to this study group and participation in its deliberations took precedence over other important activities.



State Forester Raymond was host to the meeting of the National Association of State Foresters, held in Sacramento in October.

State Forester Raymond served on the CM-2 Study Committee of the National Association of State Foresters; the initial meeting was held in Rosslyn, Virginia, late in the year. The committee was established to conduct a comprehensive study of distribution of federal funds to the several states under Section 2 of the Clarke-McNary Act. The Committee concluded that the present formula for distribution of these funds should generally be retained, up to an amount equal to the 1968 appropriation. It was believed, however, that a new formula must be developed for allocating additional funds which may become available above the 1968 fiscal year base.

One of the highlights of the year was the meeting of the National Association of State Foresters, held in Sacramento in October and hosted by State Forester Raymond. Initial planning for this event began in January. The State Forester, the Chief Deputy, and many staff members gave substantial amounts of time

to preparations and arrangements for this meeting. The last previous meeting of the National Association of State Foresters held in California was in 1947.

The State Forester served on an inter-departmental committee to coordinate initial operation of Oroville Reservoir. This key structure in the State Water Project was completed during the autumn, and has started to fill with water.

As a result of a request by the Chairman of the State Board of Forestry all Forest Practice District Committees reviewed Forest Practice Rules for the entire state. Meetings were held in each Forest Practice District, and a number of important changes made to bring the rules up to date.

Chief Deputy State Forester Moran was chairman of a meeting between the five "contract" counties, held in Monterey. A major point for discussion was impact on the "contract" counties of cut-backs in the Division of Forestry budget and possible consequent reductions in fire protection levels. The Chief Deputy also attended several meetings of the Southern California Watershed Fire Council to report on the Division's activities and changes in program levels.

### *Training Activities*

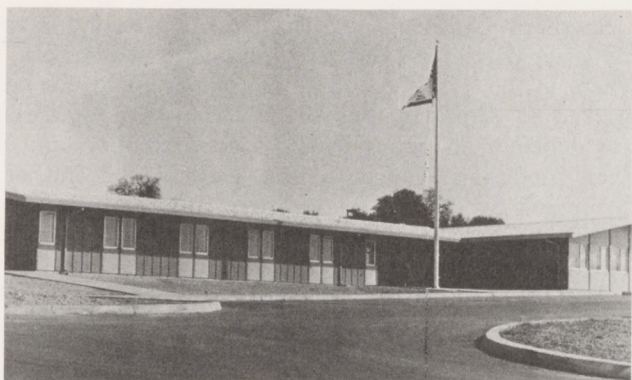
A major highlight of the 1967 Training Program occurred in June when construction of the new training facility at Ione, Amador County, was completed, and occupied by the training staff.

Known officially as the California Division of Forestry Fire Academy, the facility is designed to accommodate up to 50 students on a "live in" basis. The facility has three classrooms, a 3-room fire laboratory, and an administrative building with offices for the staff. Several hundred acres nearby are available for field training. There is a 10-stall equipment shed, with a storage room; and a kitchen, dining room, and dormitory for both students and instructors complete the physical plant. Classroom and laboratory space make it possible to conduct several courses at the same time without conflict. Most of the Academy training staff—numbering thirteen persons—was transferred from the Training Centers at Ramona and Sutter Hill, which were closed.

The first instruction to be given at the new Academy was the Basic Law Enforcement classes, beginning in August. Forest Fire Truck Driver classes were begun in October, after close of fire season. All new Drivers received the five-week Basic Course during the winter.

The final Forestry Equipment Operator class—for 20 men—was held at the Ramona Training Center. Subsequent classes for Forestry Equipment Operator will be held at the Fire Academy, and field practice will be given at the Camanche Reservoir Field Training site.





A major highlight of 1967 was completion of the California Division of Forestry Fire Academy, a new training facility at Lone, California.

In another area of training, the Air Base Managers Workshop was continued in 1967. This cooperative program with the U. S. Forest Service was begun in 1966 to train selected personnel in skills of air attack base operation and management.

Participation in the Tri-Agency Middle Management Development Program continued throughout 1967. Ten field managers completed this two-week



A class in Law Enforcement at the Fire Academy. There are three classrooms, a fire laboratory, and other facilities for several concurrent courses, with living accommodations for fifty students.

program, designed to develop organization and management skills. Some fifteen headquarters staff employees completed a special in-service training program in "Techniques of Operations Research" from the Extension Division of Sacramento State College; this course was developed at the request of the Division and the Department of Conservation.

Late in 1967 the Training Committee began extensive review of training needs, and initiated a comprehensive Training Plan designed to set forth required employee development standards for all classes. Administrative approval of the Training Plan will be followed by preparation of standardized training material for statewide use beginning in the fall of 1968.

## Planning and Coordination

Planning activities during 1967 included both short term and long-range studies.

The Planning Coordinator participated in a study by the Governor's Survey on Efficiency and Cost Control, which analyzed Division of Forestry activities, and prepared recommendations to improve efficiency and reduce costs. The State Forester's Policy Review Task Force completed a study of policies of the Board of Forestry, and legislation pertinent to them.

Data, surveys, and studies were provided to the Administrator of the Resources Agency, for use in negotiations concerning the redwood national park issue. Analyses were made of legislation proposed for amending the Forest Practice Act. Legislation for improved water quality control was studied, and hearings on this and other resources-oriented matters were attended. A report was prepared on forest tax and forest management laws of the fifty states, and their interrelations and effect on open space legislation were studied.

Many new techniques useful for cost control and improvement of efficiency were studied: program budgeting and program cost accounting; operations research methods; land use information systems; electronic data processing and computer techniques for fire control command centers, fire protection reporting, and other information retrieval tasks. Their possible applications to Division operations were evaluated.

Resource conservation and development projects were instituted in Lassen and Modoc counties. These planning projects—in co-operation with the federal government and local agencies—are designed to improve economic conditions by development of human and natural resources.

## FIRE CONTROL

Objectives of the fire control program are to prevent and control forest fires to a degree which will hold damages at a level that will not impair the flow of economic and social benefits from the wildlands. Primary program responsibilities are fire control planning and operations, and civil defense and other emergency operations of the California Division of Forestry, including statewide dispatching of forces.

### Fire Control Section

The State Forester has delegated staff authority and responsibility in fire control operations and planning; equipment management, and communications; operational research and development; and air operations to a section in his office known as the "Fire Control Section." The section is headed by a Deputy State Forester who reports directly to the Chief Deputy State Forester.



This functional staff organization is responsible for gathering and analyzing information; preparing statements of objectives, policies, and plans; developing standards; carrying out instructions; and Statewide coordination of programs delegated to the section. Responsibilities include field review, inspection, and evaluation of operational plans and activities. This section also coordinates cooperative programs with state, federal, and local agencies, Section representatives, working with District staff personnel, conduct inspections and provide technical advice and services to the Districts in program areas for which they are responsible. Communications of statewide import are answered by the section; those concerning local problems are referred to the administrative District for reply. The section is responsible for lateral communications and cooperative action with other staff sections upon matters for which other sections may have an interest or responsibility.

### Weather and Forest Fires in 1967

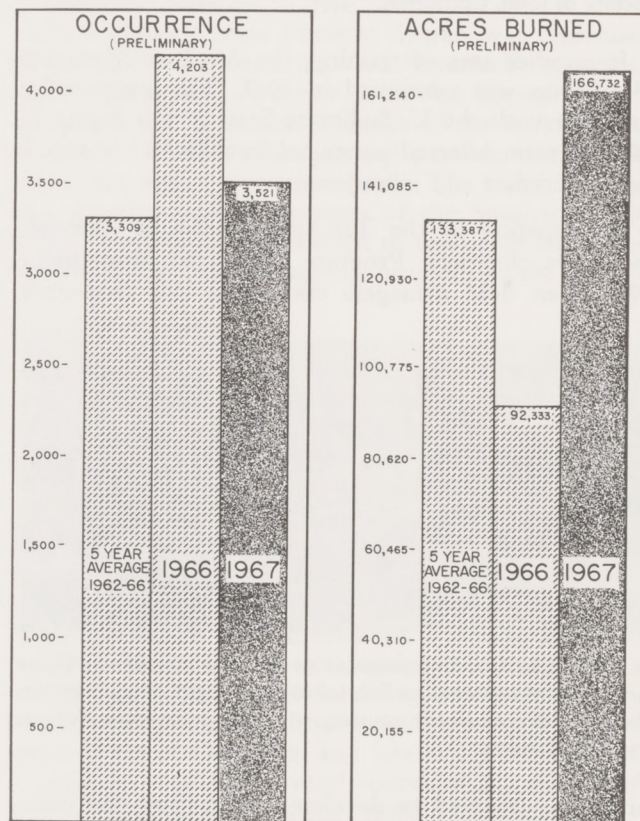
The 1967 fire season was one of contrasts, though the record of fire weather severity shows it to be about normal over-all. The season was rather late in starting—later in fact than any of the previous ten years—the result of a cold and very wet spring. The Sierra was still receiving snow in May, particularly over the central and southern portion, during which time several new records for water content of the snow pack were established. Although fire season had been declared open by June 1 in all Districts, in the first few weeks of the season there were areas in the San Joaquin Valley where the Division was as concerned with flood control as with normal activities.

By the end of October, the State was about evenly divided between portions that had accumulated above or below normal seasonal fire weather severity. Five of the twelve sample areas were above normal and two were almost normal. The average of the twelve areas shows 1967 to be seventh in order of severity in the ten-year period 1958-67, with 1958 being tenth and 1961 being first.

The summer months were uniformly hot. Only minor variations occurred in the pattern that was responsible for the hot weather. This persistent pattern allowed thunderstorm activity to occur at intervals over southern California and the southern Sierra but served to prevent it elsewhere. The net result statewide was a relatively small amount of lightning activity. The north wind pattern—so often affecting the northern part of the state in early fall—held off until the last weekend of October. Then, one day of wind was the forerunner of the year's most disastrous occurrence. A strong offshore wind in southern California, beginning on October 29 and continuing into November 1, was responsible for the year's largest fires.

Southern California experienced very heavy rains the latter part of November to end their season; elsewhere in the state the end of the season could not be marked so definitely. Fall precipitation in most areas was deficient, in rather widely spaced small amounts. Even though all the state had declared the end of fire season by November 20, there had not been one major rain-producing storm in northern and central California by the middle of December.

According to preliminary statistics the Division suppressed 3,500 forest fires that burned 166,715 acres on State Responsibility Areas which it protects directly. For comparison in 1966 there were 4,202 fires that burned 92,333 acres; the five-year average is 3,309 fires and 133,387 acres burned.



Fire occurrence and area burned in state responsibility areas, direct protection area, zones 1 and 2, of the California Division of Forestry. Number of fires was less than last year, but slightly above the 5-year average. Area burned was greater than either last year or the 5-year average, largely due to fires which burned more than 100,000 acres during a 4-day period in late October.

If the totals, for both incidence of fire and acreage burned are used as a measure, the year 1967 generally would be considered one of those years that is more severe than normal. A closer examination shows that with exception of a four-day period starting October 29th, acreage burned would have been one of the lowest on record. During this four-day period tinder-



dry grass, brush, shrubs, and trees throughout most of the southern California counties burst into flames easily and with fireball ferocity as strong, dry Santa Ana winds drove the humidity down to almost zero. Fires soon began to occur over the entire southern California area. Weather conditions being what they were, most of these fires became large. All available fire control men and equipment were soon committed to fires burning on over 100,000 acres, or 160 square miles of countryside. In addition to the wildlands burned, over 150 structures were consumed with losses estimated at ten million dollars.

Some of the larger fires that burned during this period were: the Paseo Grande, 48,600 acres; the Woodson, 33,000 acres; the Bailiff, 20,000 acres; and the Mott, 10,000 acres.

Other statistics for the year of 1967 include 285 lightning-caused fires, compared to 222 last year, and a five-year average of 226 per year. The other 3,200 fires were man-caused. Fires classified as "miscellaneous" have again topped the man-caused list with a tabulation of almost 1,000. Miscellaneous was followed by 700 incendiary, 600 machine use, 550 smoking, 350 debris burning, 285 lightning, and 70 in the camp fire category.

The Division also took direct action on some 2,350 "Non-Forest" fires (fires in structures, vehicles, or refuse, are classified as non-forest fires). In many instances the non-forest fires are potential forest fires if they are not extinguished quickly.

To illustrate the potential damage of fires starting during extreme weather conditions, one need only consider that by far the greatest damage from forest fires for the entire season was sustained during relatively short periods at the end of August; October 14 to 21; and October 29 to November 4.

### Fire Control Organization

To meet detection needs during 1967, the Division operated 77 lookouts, supplemented by two aerial patrols in the North Coast.

In the interest of economy, five lookouts were discontinued in 1967. These lookouts—Mathison in District I, Chalks in District V, Little Mountain, Bolero and Gilman Peak in District VI—were selected on the basis of past reporting history, decreased visibility due to smog, availability of other local reporting sources, and overlapping coverage from adjacent lookouts.

Additional economies included deletion of five helicopter foreman positions statewide, and one forest fire station—Termo in Lassen-Modoc Ranger Unit. Thirty patrolmen positions were coded as Fire Prevention Officer I, and cutbacks were made in Forestry Equipment Operator and Forestry Cook positions.

In recognition of their increased protection capabilities and the spirit of cooperation which exists between the two agencies, the Bureau of Land Manage-



Mendocino County aerial fire patrol. Two of these patrols, supported co-operatively by the Division of Forestry and the timber industry, supplement fixed lookouts for detection of fires in the north coastal area.

ment assumed direct protection for 185,013 acres of land previously protected by the California Division of Forestry. Of this amount, 101,783 are State and private lands, and 83,230 acres are federally owned.

In 1967, the Division of Forestry operated with the following ground attack organization:

Forest Fire Stations .....	235
Bulldozer-Transport Units .....	57
Firetrucks .....	379.

The fixed-wing tanker phase of air attack continued as a cooperative program with the U.S. Forest Service at the same level as 1966, except that one air tanker for the Department of Water Resources' Oroville Dam Project was terminated on June 30, 1967. The Division contracted for 21 air tankers and the Forest Service for 16, which were distributed among 20 air tanker bases in California. The Division and the Forest



Preparing a fire-retardant mixture to be dropped on a forest fire from an air tanker, Ukiah Air Tanker Base, Mendocino County, Calif.

Service manned and operated 7 bases each; the remaining 6 were manned and operated jointly. All air tankers were subjected to a pre-season inspection by a CDF-USFS team; additional inspections were made during the operating period. A training program for



all new air tanker pilots was developed by the Division and Forest Service and conducted at the Forest Service Northern California Service Center during the last two weeks of June. Such a training program is a necessity, if the full value of air tankers for the full season is to be obtained. The Division started six air tanker base improvement projects during the summer, which are planned for completion before the 1968 fire season. Two of these are at cooperative bases with joint participation in planning and funding.

When the Division of Forestry first began to use air tankers, they were available from a relatively large number of operators. Many aircraft operators went into this business in the early stages solely in anticipation of need for this service by fire control agencies. Fire control agencies rapidly learned to use tankers more efficiently, demanding high standards of personnel, equipment, and performance; and large fire occurrence decreased. Many operators then withdrew from this highly speculative enterprise, and the number of air tankers available declined rapidly. In the peak year—1961—an estimated 150 air tankers were available, from 38 operators. By 1966, air tanker services were available from only six qualified operators. Contracts were renewed with five of these operators in 1967; the sixth had sold his business to one of the other five at the end of the 1966 fire season. During 1967 the remaining five operators had a fleet of only 43 air tankers, 37 of which were under contract.

Although we experienced several incidents, the season was marred by only one major accident which totally demolished the aircraft but, fortunately, the pilot survived with minor injuries requiring several days hospitalization for observation. Again, as in the past few years, air tankers were credited with holding a number of fires until crew arrival, thereby assisting in reducing the number of large fires.

The number of light fixed wing support aircraft under contract for air tanker coordination, supplemental detection and observation, or reconnaissance was reduced from 19 to 15 because of budget reductions. Thirteen of these aircraft were assigned to air tanker bases, and two to established detection patrols in lieu of lookouts. Availability of light fixed wing aircraft that can be hired for emergency situations is reduced each year. Many fixed base operators find the charter business more lucrative or find it impossible to maintain aircraft for the limited amount of forestry use.

The Division's "helitack" program for 1967 was deleted in its entirety through the general budget reduction. Helicopters under contract to the USFS were used when they were needed and could be available. Few helicopters are available from the industry which are not wholly or partly committed to contract users. It is difficult to maintain the required level of trained personnel necessary to do an acceptable job

without having aircraft under firm contract and available.

### **Contracted Fire Protection**

The counties of Kern, Los Angeles, Marin, Santa Barbara, and Ventura have maintained effective county fire departments for a number of years. Recognizing the capabilities of these departments, the Division contracts with them for protection of 4.2 million acres of lands in State Responsibility Areas. In the 1967-68 Fiscal Year budget the State appropriated 2.4 million dollars for protection of these lands. The annual meeting of Division administrative personnel with county fire chiefs was held in Monterey during July. This meeting provides for yearly discussion of mutual problems. District headquarters and the State Forester's headquarters reviewed administration of each contract on the ground with separate fire chiefs. During the past fire season the Division provided a substantial amount of assistance to contract counties in times of need, in recognition of the State's responsibilities to these areas.

During 1967, the Division contracted with 26 counties to provide fire protection in local responsibility areas. This cooperative program is fully reimbursed to the State. The level of service varies with the desires of the local agency and is specified in each particular contract. This is a partnership program between the State and local agencies of government; it endeavors to provide an effective, flexible, integrated fire protection service as economically as possible. The total dollar level of reimbursable services for the 1967-68 Fiscal Year was six million dollars.

As representatives of a California fire service organization, Division personnel participated in meetings of firemen and fire chiefs at all levels. Contact is maintained with the Office of the State Fire Marshal and the Pacific Fire Rating Bureau. Ranger Unit and District administrators have frequent need to meet with county boards of supervisors, county planning commissions, and other county officials to discuss problems of mutual interest.

### **Cooperation**

Again in 1967, cooperation and close liaison between the Division and the U.S. Forest Service proved very beneficial to both agencies.

Near the close of the 1967 fire season, southern California was faced with several large fires burning at one time, with weather conditions producing extremely high fire danger. Most of these fires were managed on a joint basis with the Forest Service. Air tankers, which included most of those available in the State, were managed jointly for these fires by an air coordinator from each agency. Conservation Camp crews from the Division's Conservation Camp Program



were used extensively by the Forest Service on large fires on the Cleveland, Los Padres, and San Bernardino National Forests.

Inspections of equipment and personnel by both Forest Service and CDF representatives continued throughout the State. These forces are contracted by the State from the Forest Service for protection of approximately 5.2 million acres of State and private land located inside the National Forest boundaries.

Several training sessions were conducted cooperatively by the two agencies including air base operations, dispatching, use of conservation camp crews, use of institution emergency firefighters, and air tanker pilot training.

Cooperation between the Bureau of Land Management and the Division continued with the Bureau furnishing fire protection for a large block of private land in the Lassen-Modoc Ranger Unit. Local Division and Bureau unit managers jointly reviewed fire plans and emergency operating procedures for their areas.

The Division's fire research and equipment development activities are highly interrelated with similar activities of other governmental and private agencies and companies. The great progress made in these programs in recent years is due mostly to the cooperative effort of mutually interested groups.

A seminar was held at the U.S. Forest Service Riverside Fire Laboratory in February. Nine agencies representing federal, state, and local governments, plus the University of California, reviewed work that each had done on many low growing, low volume so-called "fire resistant" plants, and laid groundwork for coordinating future research. Agreement was reached on the content of a publication for the general public describing how to landscape for safety from forest fires.

In March, Division meteorological and research personnel joined with meteorologists from the U. S. Weather Bureau, the U. S. Navy and Air Force, Meteorology Research Inc., Rand Corporation and others in a review of recent findings in fire weather meteorology along the coast of California. Also in March the fire research coordinator joined meteorologists from Aerojet-General Corporation, U. S. Weather Bureau, California Department of Water Resources, Southern California Edison Company, Pacific Gas and Electric Company, Desert Research Institute, New Mexico State University, North American Weather Consultants, and several other universities, federal agencies and private companies in a review of the current status of knowledge about cloud modification and cloud physics.

In April, several Division personnel visited the U. S. Soil Conservation Service's Plant Materials Center in Pleasanton to see progress made in developing grasses and shrubs that might be adaptable to planting on fuelbreaks or range lands. That same month

the Southern California District personnel demonstrated the Division's fire control equipment and communications systems and co-hosted members of the North American Forestry Commission Fire Control Working Group consisting of forest fire control administrators from Canada, the United States, and Mexico. In April and May fire control people joined with their counterparts in the U. S. Forest Service, county and local fire departments, the Bureau of Land Management, and private industry in several regional conferences to discuss mutual fire control problems, to learn about new developments in tools and techniques that might improve fire control operations.

In May the Division and the U. S. Forest Service held a helitack workshop in Sacramento at which some 40 helitack specialists considered past problems and possible new solutions. Also in May an initial contact was made with Cartwright Aerial Surveys of Sacramento regarding testing that company's infrared scanning unit for mapping forest fires; first tests were conducted during the southern California fires in late October.

In June and July the Division conducted extensive performance tests of several makes of large and medium sized bulldozers on the Hunter Liggett Military Reservation in Monterey County. The U. S. Forest Service had an observer at the tests, and the bulldozer manufacturers supplied their own mechanics and factory representatives.

In July and August a team of Division and U. S. Forest Service personnel flew in a Forest Service plane to all air tanker bases in California to inspect aircraft, facilities, and fire retardant quality. In August the Director of the Department of Conservation, the State Forester, and members of the Board of Forestry joined with U. S. Forest Service personnel, representatives of private timber-owning companies, and the Dean of the University of California School of Forestry in a review of the "Wildland Research Plan for California."

In September tests were made of a new mixing system for Phos-Chek fire retardant at Hemet Air Tanker Base. Cooperating in the test were members of the Division, the U.S. Forest Service Riverside Fire Laboratory, San Dimas Equipment Development Center, the Los Angeles County Fire Department, and Monsanto Chemical Company of St. Louis.

The California-Nevada Forest Fire Council held its annual meeting at South Tahoe in October. Over 70 fire control and research people attended, from most of the 11 western states, to review progress in fire research and to discuss mutual problems and procedures in hazard reduction in wildlands. The Division was also represented at the Northwest Forest Fire Council in Portland in November and at the Western Forest Fire Committee meeting in Seattle in December. The latter committee is a part of the Western Forestry and Conservation Association and



is attended by government and private industry representatives from throughout the western states and western Canada.

### *Civil Defense and Disaster Responsibilities*

The Division has civil defense responsibilities for providing assistance to the Fire and Rescue, and Radiological Monitoring and reporting programs of the Civil Defense Organization. In addition, an agreement with the Department of Water Resources provides for flood-fighting assistance. During the month of May the Department of Water Resources alerted the Division to the potential need to assist them in the San Joaquin Delta area performing flood control work. Fortunately, flooding did not occur; however, the Division was ready to respond immediately into the area with personnel and conservation camp crews. During the latter part of November and early December, Orange County Flood Control District requested assistance in sandbagging operations in the Newport Beach area. High tides had caused a serious sand erosion problem. Sixteen conservation camp crews were used in this operation.

Liaison was maintained with State and local Disaster officials at various levels of the organization. Division of Forestry Rangers in 25 Ranger Units are Operational Area Mutual Aid Fire coordinators, while three Division of Forestry District Deputies are Regional Mutual Aid Fire Coordinators.

### *Water Project Fire Protection Planning*

As part of its watershed fire protection planning efforts, the Division participated in two Type IV River Basin Studies\*: The North Coast Study, and the Central Lahontan Study on the east side of the Central Sierras. These studies were made in cooperation with both federal and state agencies. Installation of land treatment measures is continuing on the Escondido Creek project in San Diego county under Public Law 566.

Fire protection services were continued under contract with the Bureau of Reclamation on the San Luis Reservoir project in the Madera Ranger Unit; and on a cooperative basis with the Yuba County Water Agency. Fire protection services on the Oroville Reservoir project are being supplied in cooperation with the State Department of Water Resources.

In addition the Division of Forestry studied fire protection needs and made plans to meet them on numerous reservoir projects in cooperation with state,

federal, and local agencies participating in water development. Included were the U. S. Army Corps of Engineers, Bureau of Reclamation, U. S. Department of Agriculture, State Department of Water Resources, Flood Control Districts, Irrigation Districts, Soil Conservation Districts, and Municipal Water Districts.

### *Communications*

During 1967, the Division of Forestry's communications system was augmented by completion of certain segments of the State Microwave System as follows:

1. The Lassen Route of the State Microwave System was completed between Redding and Susanville. This segment provided means to extend the green phone system into the Susanville Ranger's Office and allowed completion of the Air Net Intercom System in the Sierra Cascade District.
2. The Air Net Intercom System in the North Coast District was completed. This vital communication system gives each ranger unit dispatch office control of a mountain top air net base station needed to control air tanker operations. It also establishes an intercom circuit between the five ranger units and the District Dispatch Center.
3. Green phone facilities were extended into the Mariposa, Tulare, San Luis Obispo, Amador, Tuolumne, El Dorado, and Nevada-Yuba Ranger Unit offices.

Due to the "freeze" on purchase of new radio and microwave equipment, no other additional or replacement equipment was added to our inventory. At this time the Division of Forestry has on inventory: 1429 mobile radios, 733 handie talkies, 149 control consoles, 405 base stations, 112 mobile relays, 88 monitor receivers, 60 microwave terminals, and 187 microwave multiplexes.

In anticipation of eventually providing each ranger unit with its own local net radio frequency, the radio frequencies available were redistributed among Forestry, Fish and Game, and Water Resources. The net result was that each Ranger Unit in the Southern California District now has its own local net frequency. The value of this change was readily apparent during the bad fire situation in that District in late October. Each Ranger Unit enjoyed the privacy of its own local radio net. Planning is continuing so local radio nets will be available for each Ranger Unit throughout the rest of the State within the next three to four years.

### *Equipment Maintenance and Development*

The Division of Forestry operates a highly diversified fleet of automotive and heavy construction equipment. Maintaining and repairing this equipment is of

\* Type IV river basin studies are comprehensive plans developed under Section 6 of Public Law 566, for the purposes of (1) flood prevention, or (2) the conservation development, utilization, and disposal of water, and thereby of protecting the nation's land and water resources. The federal government cooperates with states and their political sub-divisions, soil and water conservation districts, flood prevention and control districts, and other local public agencies in carrying out this program.



utmost importance to the efficiency of the Division's operations.

Maintenance and repair of equipment is performed at three basic levels. First, the Foreman-driver level at the field station, for minor maintenance; second, the Forestry Equipment Operator level, usually at a County Headquarters shop, and encompassing heavy maintenance and minor repairs; and third, the Equipment Maintenance Foreman level, either in a Forestry shop by an Equipment Maintenance Foreman himself, or in an outside vendor's shop under absolute direction of a Maintenance Foreman.

The Division continues to stress operation, maintenance, and repair, for the three groups as outlined. Foreman-driver groups now being trained in the new Fire Academy are given eight hours of classroom and four hours of field instruction on fundamentals of maintenance during the first two days of their five-week course. Foreman and drivers are then required to practice these maintenance fundamentals throughout their training course at the Fire Academy, returning to their units with full knowledge of proper methods of maintenance.

The Forestry Equipment Operators receive even more in-depth training during their course at the Fire Academy. Their training includes five days of instruction in maintenance and tuneup methods, taught primarily by instructors from the major manufacturers of vehicle components. Items such as primary and secondary electrical system repairs, carburetor adjustment and maintenance, tire construction, and fuels and lubricants are taught to equipment operators during their course. In addition to the emphasis on repair and maintenance methods, Forestry Equipment Operators are also given 10 days of instruction in operation of various types of heavy equipment, by instructors representing manufacturers of the equipment.

At the Equipment Maintenance Foreman level we continue the annual one week training session. Curtailment of funds in the spring of 1967 required cancellation of the training course for 1967; however, the course will be given again in February of 1968, since

it is a very important integral part of our overall training structure.

Equipment Maintenance Foremen, under guidance of Division Headquarters personnel, are currently preparing maintenance training guides for use in their day-to-day training of foremen and drivers at Fire Control stations. This training material includes slides, handouts, examinations, and visual aids; it will provide continuity of subject matter throughout the entire Forestry system.

Although one Equipment Maintenance Foreman position and four Heavy Equipment Mechanics positions were financed in the 1966-67 fiscal year budget, budgetary cutbacks dictated deletion of three of the positions prior to actually filling them. One Maintenance Foreman and one Heavy Equipment Mechanic were employed. Three Conservation Camp shops which require a Heavy Equipment Mechanic for actual operation have to date not been activated and are still utilized as a Class B facility rather than a Class A Shop.

The November fires in Southern California required movement of Forestry equipment from the farthest areas of the State. It is indicative of the level of maintenance within the Division of Forestry that buses, firetrucks, transports, and administrative vehicles responded to, operated on, and returned from the fires with an absolute minimum of down time or mechanical failures.

Forestry Equipment Engineers worked with nine counties in preparation of specifications for purchase of 12 new pumper trucks. Thus far, three of these units have been completed. Twenty-seven firetrucks were completed and delivered to the Division of Forestry in 1967.

The latest model firetruck delivered to the field in 1967 was the Model 8. This unit has a tilt cab, conventional drive, and carries 1200 gallons of water. It has a 500 gallon per minute (GPM) pump amidships and an 85 GPM auxiliary pump, and provides seating for 3 men with ample storage space for fire hose and tools.

## RESEARCH AND DEVELOPMENT

Research and development play important parts in operations of the Division of Forestry. Research provides a foundation of factual knowledge that helps to understand the complex problems the Division faces in fire prevention, forest protection, and development and management of State Forests and other wildlands. Timely development of equipment and methods provides additional means for meeting management and protection responsibilities due to increased pressures and rapid changes in use of wildland resources.

To meet its research and development needs the Division relies heavily on cooperative agreements with agencies and institutions whose primary activity is scientific research. Research was continued in several different lines of activity during the past year.

### Fire Research

The Division was involved in many fire research projects in cooperation with a number of other agen-



cies, both public and private. Funds were contracted to the U.S. Forest Service's Pacific Southwest Forest and Range Experiment Station for research in fire meteorology; in fire control systems and tactics; and in establishment and maintenance of fuelbreak systems. Money was also contracted to the University of California, School of Forestry, at Berkeley for a continuing study of the economics of fire protection. This latter project has recently concentrated on establishing mathematical models of air tanker systems with special emphasis on the probability of success of using different air tanker types in a variety of fire conditions, including the distribution of fire occurrence and size, topography, fuel, and fire load index. One special study suggested a day-to-day optimum air tanker distribution pattern using both the initially assigned air tanker locations and alternate locations related to the expected fire load index.

Two principal problems still face fire control agencies in permanent establishment of fuelbreaks: controlling brush regrowth and reinvasion; and establishing low-volume, low-stature plants in the cleared breaks. Several public and private agencies are working cooperatively in these programs. One interagency seminar produced a mutually accepted sampling design for testing herbicides under a wide variety of climatic and vegetative conditions. Another seminar resulted in assigning over-all direction of ecological studies of plants which show promise for planting on fuelbreaks and around residences. The seminar also resulted in interagency agreement on a new pamphlet published by the University of California Agricultural Extension Service recommending to homeowners what to plant and how to maintain the plants around homes to



Field test of a new nozzle made from polycarbonate (Lexan). Nozzles of this material are harder than brass and one-third its cost, yet they weigh only a few pounds.

minimize damage from wildfires spreading into residential areas.

The Experiment Station, with the help of some Division personnel and people from other agencies, continued to study characteristics of marine air inva-



Performance tests of several makes of large and medium bulldozers were conducted during the summer. Tests included line building capability in different kinds of vegetation and topography, winching ability, and cross-country performance.

sion of coastal and inland California, as well as structure of destructive Santa Ana winds.

Much attention is being given to quantitative techniques of analyzing fire control systems. Such techniques can lead to more effective decisions concerning short-range planning and implementing of specific day-to-day tasks, and long-range planning to meet broad objectives and goals. The Experiment Station and the Division completed a two year study of rates of hand-line construction using Conservation Camp inmate crews. Considering the variables included in the study, results will be given in terms of probability of achieving a desirable goal of line construction in different fuel types with different crew sizes within specified time limits.

In past years, people guiding bulldozer operators at night in fireline construction have carried flashlights and have been difficult to see. This year a few of the guides wore brightly flashing electroluminescent Sam Browne-type belts. Initial evaluation reports showed excellent results. The belts will be tested through the 1968 fire season before conclusions are reached regarding more widespread use in the Division. Other tools being tested in the field include new 1½-inch nozzles made from Lexan (polycarbonate), a fraction of the weight and cost of traditional brass nozzles; a system of oblique aerial colored slides of an entire ranger unit to aid the dispatcher in making decisions about man-



power and equipment needs; several new types of synthetic hose for use on firetrucks and at air tanker bases; a much faster and simpler mixing system for Phos-Chek fire retardant. The prototype remote telemetering fire weather station purchased in 1966 was placed in operation at Howard Forest in mid-1967. The station is designed to observe all elements needed for fire danger rating and to transmit this information via the Department of Water Resources' North Coast Telemetering System and the State's microwave radio network to automatic read-out and memory equipment located in the Resources Building in Sacramento, both on schedule and on demand. Knowledge gained from testing this one station will assist in designing a total automatic fire weather sampling system and fire danger rating computing system.

In June and July, the Division conducted extensive and intensive performance tests of several makes of large and medium bulldozers on the Hunter-Liggett Military Reservation in Monterey County. Such tests are made every five or six years to assist the State in selecting and purchasing those makes and models of bulldozers which will best meet the particular needs of the Division's fire control job. Tests include line building capability in different vegetation types and topography, gradeability, winching ability, and cross-country performance.

#### **Fire Prevention**

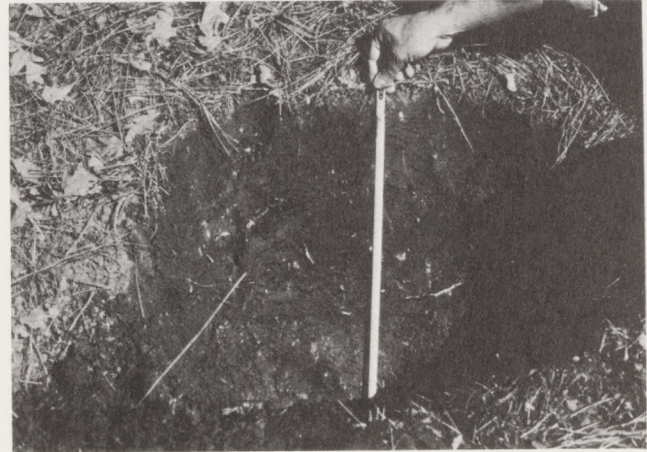
Fire Prevention Research is continuing in the Butte Ranger Unit in cooperation with the United States Forest Service, Pacific Southwest Forest and Range Experiment Station, and the Division of Forestry. This project is a field laboratory for fire prevention research. A new Research Note on this study, by the Pacific Southwest Forest and Range Experiment Station, is titled *Evaluation of Fire Hazard Inspection Procedures in Butte County, California*. This report assessed the effectiveness of fire hazard inspection procedures in securing compliance with fire safety requirements. Effects of different types of procedures, and the combination of contacts and timing were determined; and the production capacity of the inspector measured. It was demonstrated that fire law inspections consist of fire prevention education and engineering as well as law enforcement. The public was found to be uninformed about fire laws but very receptive to an inspection program.

A "children-and-matches" sociological study was initiated with George Washington University. Results are not yet available.

An attitude survey of Division employees and their feeling toward fire prevention and other Division activities was completed. Results should be forthcoming very soon from the contractor, University of California Survey Research Center.

#### **Inventory of Wildland Soil and Vegetation**

This inventory is being carried out cooperatively with the Pacific Southwest Forest and Range Experiment Station and the University of California. During



During 1967 the soil-vegetation survey was completed on 251,000 acres of wild lands. Fifty-eight soil profiles were described, and sampled for laboratory analysis.

1967, a total of 251,000 acres in Butte, Plumas, and Calaveras Counties was completed; fifty-eight soil profiles were described and sampled for laboratory analysis; coding and card-punching of soil-vegetation data for automatic data processing were completed; inventory data were prepared for use in special studies. During 1968, we will continue field mapping in Butte, Plumas, and Calaveras Counties; continue publishing maps of the Shasta County Survey; and begin publishing maps and reports of the Sonoma County Survey. Since this survey began in 1947, the soils and vegetation of over eight and one-half million acres of privately owned wildlands have been mapped within the area of Division of Forestry fire protection responsibility in Northern California.

#### **Forest and Watershed Research**

To reduce budgeted expenditures in the 1967-68 fiscal year, research efforts in forest and watershed management were cut back. Effective July 1, 1966, studies on seed tree effectiveness, forest growth prediction, gall rust, and California hardwoods, under contract to the University of California, were discontinued. Financial support for watershed research at the San Dimas Experimental Forest of the U. S. Forest Service also was terminated, but assistance in the form of Conservation Camp labor will continue.

Research projects remaining after this adjustment of the program consist of studies in planting stock physiology, bark beetles, dwarfmistletoe, and forest rodents. All of these are being conducted by contract with the University of California.



## FOREST, RANGE, AND WATERSHED MANAGEMENT

The objective of this program is to aid and encourage development and utilization of California's vast forest, range, and watershed lands for the greatest public benefit. Encouragement and assistance to landowners, regulation of use, and demonstration of good wildland management practices are means of attaining this objective. Knowledge needed to achieve best development and utilization of these resources is sought through research and practical field studies.

### State Forests

The Division manages eight State Forests with 70,238 acres of forest land representative of California's varied timber types. These demonstration forests are managed for timber, Christmas trees, recreation and other uses, but one of their major functions is to provide a laboratory for demonstration and experimentation of forest management. A staff of professional foresters is assigned to the four largest forests to direct the experimental and management work on 69,000 acres.

In a continuing program of harvesting mature timber and maintaining production and growth, 1967 operations produced 34,667,580 board feet of timber and 8,705 Christmas trees and miscellaneous products, with a combined value of \$573,175.00. Since 1946 receipts from the State Forests totaling \$8,888,816 have been transferred into the State's General Fund. Counties having State Forests received \$43,978 in lieu of property taxes for 1966-67; and a total of \$566,807 since the forests were acquired. Taxes have increased at a startling rate in some cases; the taxes on Boggs Mountain State Forest were \$254.83 for 1952-53 and \$3,699.14 for 1967-68.

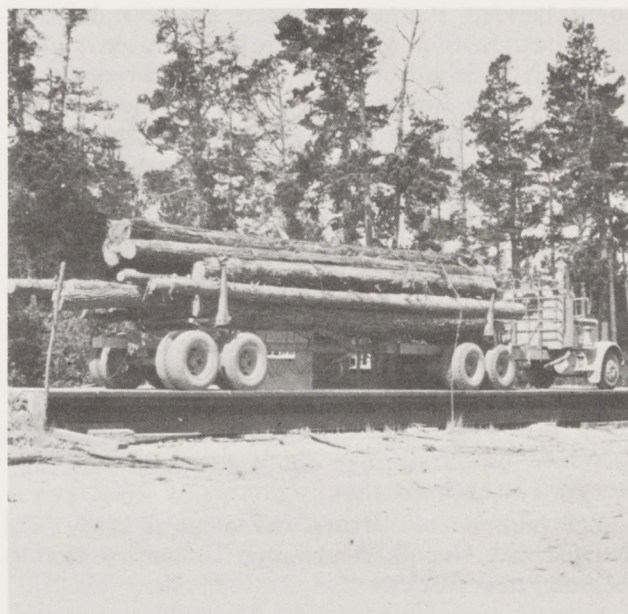
The State Forests had a 9.3% increase in the volume of timber harvested in 1967 over 1966. The allowable cut on the forests has been increased, on the basis of a recent inventory and accelerated growth. Also, during 1967 commercial cutting was accomplished on Boggs Mountain State Forest for the first time since the State acquired the property. Some three million board feet of overmature, decadent timber was removed in two sales to improve growth and health of the stand on that forest. Data from the first remeasurement of the Jackson State Forest continuous forest inventory indicates that additional increases in allowable cut are desirable. In accordance with a 1967 contract with the University of California, data from the timber inventory of Latour State Forest are scheduled for processing during 1968.

The State Forests experienced continued increases in recreational use. Some of this increase is undoubtedly in response to improvements such as the new loop horse trail near Hobergs, and completion of Mountain Home State Forest demonstration camp-

ground at Frasier Mill. The National Speleological Society held their statewide meeting in one of the Mountain Home State Forest's group campgrounds so they could explore Haughton's Cave. Camping on Jackson State Forest along Highway 20 continued at a high level and camper use at Latour State Forest increased, especially during deer season.

Work continued on the Caspar Creek Watershed Study with 1,600 yards of silt and debris being removed from the pond behind the North Fork Weir. This was completed by mid-August 1967, and the instruments were immediately put back in operation. The logging access road was constructed into the South Fork of Caspar Creek as part of an adjoining timber sale. It was necessary to install four bridges and two large culverts in the main drainage to complete this road. Besides shaping and rocking the road, exposed fill slopes were fertilized and seeded to annual rye grass to reduce erosion. The effects of road construction in a watershed will now be evaluated for a few years before the watershed is logged.

The weight-scaling study was continued on Jackson State Forest to evaluate a technique for more efficient use of manpower in handling large numbers of small logs that result from the young-growth sales. A 70-foot-long, 100,000 lb. capacity truck scale was installed and all of the logs from one timber sale were weighed and scaled. From this test we are satisfied that an accurate ratio can be determined from young growth



The weight scaling study was continued at Jackson State Forest. A typical load of young-growth logs being weighed to determine an accurate board foot-weight ratio. The scale is 70 feet long, with a capacity of one hundred thousand pounds.



timber sales. Two 1968 timber sales will be offered where the weighing technique will be combined with random sample scaling to convert timber weight to its equivalent in board feet.

Several other experiments were continued in 1967. Continuing cooperative study with the University of California on *Fomes annosus* root rot indicates that Boggs Mountain State Forest Douglas-fir are susceptible to inoculation. Cultural trials were continued on Latour State Forest to determine better techniques for pruning, thinning, and shaping white and red fir Christmas trees. In several reproduction studies on Mountain Home State Forest herbicides were used in site preparation, and fertilizers were used to test effect on seedling establishment and growth.

Plans indicate that the State Forests will sell approximately 7 million board feet more of timber in 1968 than in 1967. Better inventory information and subsequent change in allowable cut on Jackson State Forest accounts for this increase. While the total sale volume is increasing the value per thousand board feet is decreasing because a larger part of the cut consists of lower quality young-growth timber which is less valuable than old-growth.

Conservation Camp Crews provided much of the labor for fire road and truck trail maintenance, hazard reduction, and experimental work that was accomplished on all forests.

### Forest Practice Act

More attention has been directed toward state regulation of forest practices on private land in California in recent years than at any time since the enactment of the Forest Practice Act in 1945. Increasing concern is being shown by the general public over the impact of logging on parks and recreation, watershed and stream protection, fisheries and conservation, and fire hazards near urban communities. Eleven bills were introduced in the 1967 session of the State Legislature to amend the Forest Practice Act. Five of them passed the Assembly but were not approved by the Senate. The Senate adopted a resolution requesting a review of the capability of existing regulatory and advisory programs of state government to ensure that the privately held timberlands of California continue their optimum contribution to the economic growth of the State. The Senate Natural Resources Committee made a field tour of logging operations in Humboldt, Trinity, and Shasta Counties in October to see conditions for themselves.

All Forest Practice Committees conducted hearings in 1967 to determine adequacy of their district rules. Amended forest practice rules for the Redwood Forest District became effective July 7; amended rules for the North Sierra Pine Forest District became effective September 22. Early in 1968 it is expected that the South Sierra Forest Practice Committee and the Coast



The Senate Natural Resources Committee on a field tour to observe logging conditions in the Redwood Forest District.

Range Pine and Fir Forest Practice Committee will conclude hearings and present recommendations for amendment of their district rules to the State Board of Forestry. Amended rules become law 30 days after filing with the Secretary of State.

In 1967 several changes were made in district forest practice committees. Sidney D. Haynes, farm timber owner in Burney, replaced William L. Gray of Bieber on the North Sierra Committee. William H. Kuphaldt of Martell replaced Seth Beach, and Byron W. Bacchi replaced Gordon K. Van Vleck, on the South Sierra Committee. David M. Williams of Redding replaced Harold R. Crane, Jr., on the Coast Range Committee.

District forest practice rules are developed to conserve and maintain productivity of private timberlands for the economic welfare of the state and continuance of the forest industry. The State Forester administers the Forest Practice Act under policies adopted by the Board of Forestry. Division personnel inspect timber operations to determine and require compliance with the rules and the Act.

In 1967, the State Forester issued 268 original timber operator permits and renewed 947 permits, collecting \$13,685 in license fees. There were 58 fewer active timber operators in 1967 than in 1966. Some 1,860 timber operator's notices were filed in 1967. Operators reported cutting 5.01 billion board feet of timber in 1966—about 263 million board feet less than in 1965.

The Division, in 1967 made 1,850 forest practice inspections. Statewide, 93 percent of all rules inspected for were found to be in compliance, compared with 94 percent in 1966. Over-all compliance with the rules in the Redwood Forest District and Coast Range Pine and Fir Forest District was 92 percent. There was 93 percent compliance in the South Sierra Pine Forest District and 94 percent compliance in the North Sierra Pine Forest District. Inspectors observed 968 infrac-



tions of the rules in 1967, compared with 780 in 1966. Forest practice rules most often found to be in non-compliance were snag disposal, fire plan filing, erosion control, and slash disposal requirements.

In 1967 the State Forester started the first action under Sections 4615-4618 of the Public Resources Code, to correct Forest Practice violations, in two cases. The provision of the Forest Practice Act authorizes the State Forester to serve "Notice to Correct Violations." If not corrected, the State Forester can make the correction, or contract for correction, and charge the operator or timber owners for the cost, up to a maximum of \$40 per acre. This action was necessary because some operators stopped timber operations and contracted the logging to others, or simply went out of business leaving uncorrected violations. There has been increasing public support for more positive enforcement of the Forest Practice Act and Rules.

Most law enforcement by the Division was carried out administratively. The Division of Forestry sent 638 notices of violation for infraction of the forest practice rules in 1967. Division personnel sent many other letters, and held follow-up meetings with operators to improve compliance with the Rules. Ultimately, over half the areas where infractions were observed were in compliance when repeat inspections were made.

In four cases complaints were filed with county district attorneys against persons who were operating without a valid timber operator's permit. One case was dismissed and pursued by other enforcement action. Another operator obtained a permit at the request of the District Attorney. One operator was fined, and put on probation to comply with forest practice rules. One case is still pending.

Early in 1967 it was recommended to the State Forester that renewal of timber operator's permits be denied in thirteen cases; seven were continued from the previous year. In two of the 13 cases, all violations were corrected. Eleven did not apply for 1967 permits; they either did not operate, went out of business, or contracted timber operations to others and were no longer timber operators under the law.

Intensified field and administrative effort during the logging season was applied to six more cases in 1967, trying to obtain compliance. Two of these completely corrected violations; the other four stipulated correction or partially corrected violations.

Five litigation cases were formally on file with the State Forester in 1967. One of these was dropped on advice of legal counsel; and four are being continued into 1968 for corrective action, including the two cases on which the first such action started in 1967.

Action to deny or revoke permits or pursue corrective action by the Division of Forestry is pending on 20 cases for 1968, including 11 new cases. These cases are in various stages of development.

In 1968 the Division plans to make greater effort to proceed with corrective action for rule violations when appropriate and when other methods fail to gain compliance.

Affidavits were filed in 1967 by 38 owners to devote 6,243 acres of timberland to purposes other than growing timber. This is less than half the acreage filed for conversion in 1966, and the least acreage filed for in any one year. About 56 percent of this acreage was declared by owners to be for the purpose of improving grazing; 33 percent for urban development projects; and the balance for other agricultural pursuits, or for construction purposes.

The Board of Forestry approved 14 alternate plans in 1967. Ten of these plans were in the Redwood and Coast Range Forest districts to log and remove merchantable timber and promptly restock the cutover area by seeding or planting trees. One plan in each of the same forest districts provided for increased fire protection deferring the treatment of slash concentrations until salvage operations are completed. One plan in the North Sierra District allows intensive Christmas tree management and another plan provides for silvicultural thinning of small trees to improve forest growth.

Forest Practice Committee hearings will be continued in 1968 to make desirable amendments to the South Sierra and Coast Range District rules. New enforcement features of the Act, such as correction of rule violations by the Division, and charging the timber operator or owner for the corrective work, will be tested in 1968. The Division will intensify inspection and enforcement against timber operators who fail in a reasonable time to correct rule violations.

### **Service Forestry**

Service Forestry is a nationwide cooperative forest management program of professional forestry assistance to owners of small tracts of forest land and forest products producers. The federal government cooperates with the state, contributing funds which provide services of professional personnel to work with forest land owners on their management problems.

Ten foresters are employed to assist land owners in solving problems of forest reproduction, timber stand improvement, protection from forest insects and diseases, and many other aspects of forest and land management. These service foresters are located in Fortuna, Willits, Santa Rosa, Redding, Oroville, Camino, Sacramento, Fresno, Monterey, and Riverside.

The 30,000 owners of forest land tracts of less than 5,000 acres hold about 3.5 million acres of commercial forest that are vital to the State's economy, and especially to the economy of the forested counties. Many additional owners are assisted with management problems on several million acres of noncommercial





A service forester and a Christmas tree grower examine an immature Christmas tree that will become the fourth crop to be removed from this stump. Several "choose and cut" Christmas tree farms in Santa Cruz County gross approximately \$30,000 per year, as this product assumes greater importance in many areas of California.

forest land where recreation, special forest products, water, and wildlife are produced.

During 1967, California's Service Foresters assisted 212 owners per man as compared to an average of 137 nationwide. Under Cooperative Forest Management 2,124 woodland owners were assisted on more than 230,000 acres of timberland. About 6,800 acres were planted or seeded, and 2,800 acres of timber stand improvement was accomplished with forester assistance. In meeting the diversified needs help was provided to 125 forest land owners for recreation, water, and wildlife management. More than 140 owners were referred to consulting or industrial foresters because of the size, nature, or complexity of the owner's problem. An effective job of demonstrating benefits of intensive forestry generates work for forest consultants.

An analysis of the service forestry program was begun in 1967; when this survey is completed in 1968 we will have better knowledge of the total job to be accomplished, the work load and its distribution, and a review of performance standards.

Service Forestry is coordinated with other public and private programs. The industry-sponsored tree farm system is recognized for its role in improving forest management and landowners are often assisted by service foresters to become tree farmers.

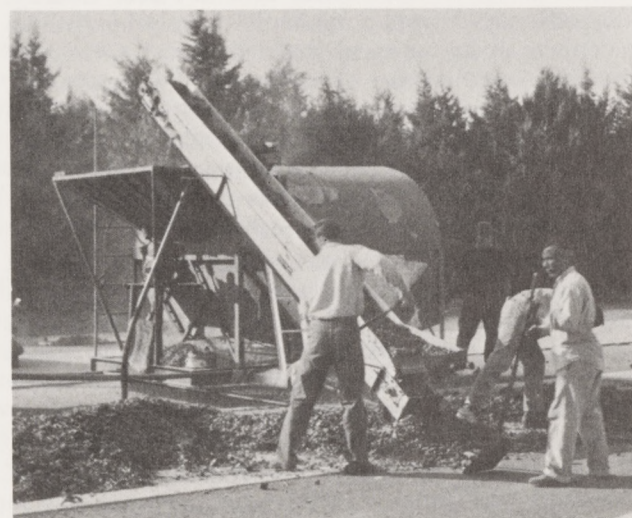
Service Foresters cooperate closely with federal and state soil conservation agencies and local soil conservation districts, and provide technical assistance to the Federal Agricultural Conservation Program for cost-sharing on forestry practices.

Under the Cooperative Forest Management Act of 1950, the U.S. Forest Service shares some of the cost of the service forestry program. Additional reimbursements are contributed by the Agricultural Stabilization and Conservation Service for providing technical assistance to the Agricultural Conservation Program.

### *Nursery and Reforestation*

The spring of 1967 marked the 45th year of continuous tree production from the Davis Headquarters Nursery in Yolo County. Trees grown in the early days were primarily for planting along county roads and state highways; production amounted to from 50,000 to 60,000 trees annually. Since 1950 the nursery has been producing trees primarily for forest products, watershed protection, and farm windbreaks; present production is 150,000 container-grown trees. Between 1952 and 1954 three additional nurseries began to produce bare root seedlings. Now the total production distributed each year to California landowners is between three and four million seedlings.

Since all trees are raised from seed, seed production is a major phase of operations. In 1922 small quantities of seed were collected locally by nursery crews for the exotic species used along roadsides. Today, Con-



Seeds being removed from sun-dried white fir cones by Conservation Camp inmates at Davis Headquarters Nursery. Cones have shattered and are being fed into a tumbler to remove seeds.



servation Camp inmate crews throughout the state collect more than 13,000 bushels (about 180 tons) of cones for 10,500 pounds of clean seed. Seeds are removed from cones in a new extraction plant at the Davis Headquarters Nursery which began operating at full capacity in 1967. The plant has a capacity of 500 bushels every two to four days. To supplement the plant operation, cones are also opened in the sun and seeds removed in portable equipment.

There was a slight reduction in reforestation efforts on private land, some 70 acres less than the preceding year. This was due primarily to a reduction in direct seeding following clear-cut logging. This kind of logging followed by seeding, rather than leaving seed trees, is permitted under the Forest Practice regulations. There were 7,790 acres seeded, a reduction of 340 acres. Planting seedlings, on the other hand, increased by some 250 acres, for a total of 5,380 acres. California's place in the nation in reforestation again improved. Although we remained fourth in seeding, an improvement was made from 19th to 18th in combined seeding and planting.

The State Forester's Reforestation Advisory Committee met twice during the year. In June members toured reforestation projects in Amador and Calaveras counties. The tour stressed methods used to control "mountain misery." Mountain misery (*Chamaebatia foliolosa*) is a plant forming a dense ground cover in sparsely timbered middle elevations of the Sierra Nevada. The cover prevents successful natural and artificial reforestation. The Committee found that the pest can be controlled by burning then spraying succeeding sprouts with herbicides.

In early November the Committee compared results of different regeneration methods within a 1960 burn on private and Forest Service land in Placer County. Methods ranged from a minimum of only controlling rodents to protect natural seed fall from trees around the burn to the ultimate of mechanical site preparation, planting seedlings, and spraying competing brush. On this particular burn all methods provided an adequate number of young trees. Committee members also visited two of the Division's reforestation studies, one of seeding and one testing recently developed hybrids.

Reforestation studies were conducted in the laboratory and field. New root growth as a measure of seedlings' physiological condition was used to determine best storage treatments of white fir seedlings. Seedlings were grown in a controlled temperature water bath for thirty days after receiving the storage treatments. Two weeks cold storage appeared to be better than no storage since more new roots were produced from that treatment.

Two field tests in the central Sierra Nevada compared broadcast and machine seeding of white fir, Douglas-fir, and ponderosa pine. Where competing grasses invaded part of the 1966 seeding there were

few seedlings remaining at the end of the 1967 growing season from either the broadcast or machine application. However, where there was no grass competition plots were well stocked with seedlings from broadcast seeding. Machine seeding results were poor. Seeding tests done in the fall of 1967 will be evaluated in 1968.



Planting 3-month-old fir seedlings grown in plastic "bullets," Forest Creek Burn, Calaveras County. These plastic containers were tested to determine if they improved seedling survival.

Propagation of seedlings in plastic bullet-like containers of different depths was tried in the spring. In the central Sierra Nevada survival was generally very poor, but near the coast the deeper "bullets" provided good survival.

The effects of burning and different herbicide spray treatments in mountain misery plots were evaluated. Growth of pine and fir seedlings after three years was excellent where densities of mountain misery were controlled by treatments.

Tree improvement studies were continued. The first seedlings from hand pollination using Monterey pine pollen on knobcone pine mother trees will be available for sale to the public in early 1968. This Monterey  $\times$  knobcone hybrid has possibilities for rapid growth in low elevation droughty sites. Work on the Jeffrey  $\times$  Jeffrey  $\times$  Coulter pine hybrids promises to produce a hybrid that will survive well and grow rapidly in middle elevations of the Sierra Nevada. Well-formed, rapid growing ponderosa pine parent trees were selected for hand pollination to pro-



duce offspring superior to that from natural pollination.

### Forest Pest Control

The objective of forest pest control activities conducted by the California Division of Forestry is to detect, appraise, and control damage to forest trees from insects, disease, and animals. Action to control insect epidemics and disease infection centers on state and private lands is taken within "zones of infestation" established by the State Board of Forestry. The activities are usually undertaken by the Division in cooperation with landowners and the U.S. Forest Service.

Bark beetle activity in 1967 increased in several areas of the north end of the State. The Douglas-fir beetle activity in the north coastal Douglas-fir forests decreased considerably.

Forest disease conditions changed slightly in 1967. Several new infection centers of root diseases were found. Discovery of new outbreaks of white pine blister rust in Tuolumne County extended the southern limit of this disease about ten miles.

Deer depredation continues as the State's primary animal damage problem. Mountain beaver caused considerable damage in Humboldt and Del Norte Counties.

Detection of forest pest damage is obtained through individual reports and a cooperative aerial survey with the U.S. Forest Service. The Division surveys over five million acres of timberland.

Three large cooperative appraisals were participated in by the Division: (1) an appraisal of conditions affecting forest trees in the Tahoe Basin, with the California and Intermountain regions of the U.S. Forest Service, and the Nevada Division of Forestry; (2) the Douglas-fir bark beetle epidemic covering 1.6 million acres in the north coastal Douglas-fir forest, with the U.S. Forest Service; (3) the Trinity Lakes western pine beetle infestation, involving 133,000 acres, with the U.S. Forest Service.



Infested trees were cut and burned in an insect control project by the Division of Forestry at Mountain Meadow Reservoir, Lassen County.

In bark beetle control projects 5,245 trees were treated on private land and in four State Parks. Control work on white pine blister rust, in cooperation with private owners and the U.S. Forest Service, was extended to 4,494 acres of private land.

The California Forest Pest Control Action Council was concerned with the need for more funds for research about forest pests. Funds should be made available to keep abreast with forest pest problems. The forest insect research center at Hat Creek, Shasta County, should be retained to continue forest insect research efforts in the northern part of the state. The Council asked the Legislature to support implementation of the Fish and Game Commission deer management policy and revise the big game depredation laws to authorize issuance of permits sufficiently in advance of actual damage so practical programs of hunting could be conducted. The wildlife biologist position with the U.S. Bureau of Sport Fisheries in Sacramento has had considerable turnover. The Council asked that this position be upgraded to provide more stability and tenure. The root rot (*Fomes annosus*) was prevalent in the State. The Council recommended that where landowners wish to prevent this disease, freshly cut stumps should be treated with borax. The Council also opposed changing the status of the squirrel from a game animal to a fully protected animal; the proposed change would prevent any control action against squirrels which do considerable damage in the forest.

Plans for 1968 include continuing the direct control for bark beetles, cooperative appraisals with the U.S. Forest Service and landowners in Northern California, and reviewing the white pine blister rust program.

### Timber Taxation

Article 12 $\frac{3}{4}$  of the State Constitution exempts timber from taxes following cutting, under certain conditions. A Timber Maturity Board must declare exempt timber "mature," 40 years or more after cutting, before it is returned to tax rolls. The Maturity Board consists of a representative from the State Board of Forestry, one from the Board of Equalization, and the Assessor of the county where the timber is located.

Because the Board of Forestry is represented on the Maturity Board the Division of Forestry has certain responsibilities for administration of Article 12 $\frac{3}{4}$ , including record keeping, participation in field examinations, and assisting the Board of Forestry representative. An experienced forester from the State Forester's staff is assigned to this work.

The Legislature amended Chapter 1847 of the Revenue and Taxation Code in 1965. The change required timber owners to file affidavits for exemption of cut-over timber under Article 12 $\frac{3}{4}$  of the Constitution, and for Maturity Boards to consider timber stands for return to tax rolls as soon as they pass 40 years after cutting. Formerly the Assessor called for Maturity



Board action only when he thought exempt stands mature, usually evidenced by commercial operations in comparable stands in the county.

The amended law immediately created a backlog for Maturity Boards to consider all exempt stands more than 40 years old including those previously exempt that had not been examined.

Maturity Boards considered most of these parcels in 1966 and declared a number of them mature. During 1967 Maturity Boards overcame the remaining backlog in most of the timber counties.

Maturity Boards were formed and acted for the first time in four counties: Butte, El Dorado, Plumas, and Tehama; they continued action begun in 1966 in Humboldt, Lassen, and Siskiyou. These Boards declared 86,611 acres on 60 properties mature, compared with 70,380 acres on 143 properties in six counties in 1966 (see table). The Division of Forestry assisted the the Board of Forestry representative throughout field examinations and hearings. By the end of 1967 a cumulative total of 462,773 acres of timber on 938 properties had been declared mature for assessment purposes.

In 1967 the export log market caused significant increased cutting in young growth and older cutover stands within an economic radius of deep water ports (Humboldt Bay, Sacramento, and Stockton).

If such operations continue to increase as is now indicated, more frequent reexaminations and maturity declarations would be required in the future for stands previously found immature.

Timber Maturity Declarations in 1967  
Maturity Board Examinations

County	No. of Properties	Examined	Number of Acres Declared Mature
Humboldt	46	33,977	21,154
El Dorado	1	10,382	10,179
Butte	2	41,900	15,286
Plumas	4	43,950	14,777
Tehama	1	16,066	12,287
Siskiyou	4	24,815	11,467
Lassen	2	5,341	1,461
Totals	60	176,431	86,611

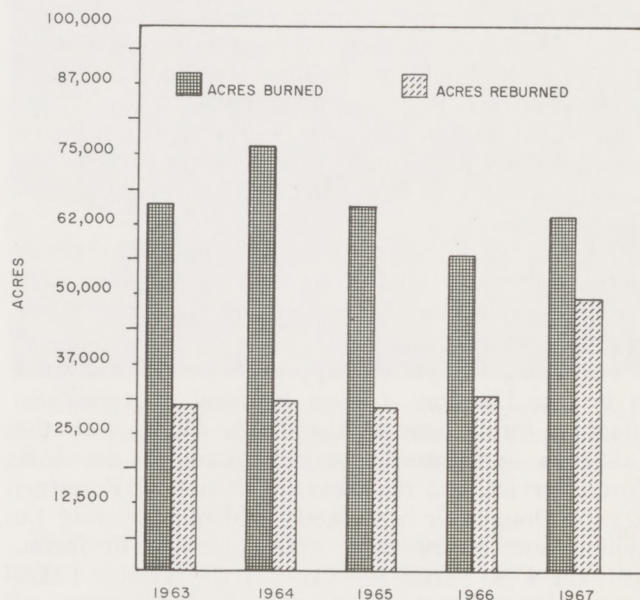
### Brush Range Improvement

The Range Improvement Program entails administration of range improvement burning, advisory services, and standby fire protection in cooperation with private landowners desiring to use fire as a means of converting brush-covered lands into forage lands. Prime objectives of the program are to increase forage production on low quality brush-covered land, to stimulate fire prevention and protection measures, and to promote watershed protection and conservation practices. The program provides for advisory services to applicants for controlled burning permits as to pre-

cautions to be taken to prevent damage to adjacent property owners due to such burning, and to provide standby fire protection to the extent personnel, fire crews, and fire fighting equipment are available.

Ranchers and sportsmen used fire in clearing 64,633 acres of brush range land in California during 1967. Formal applications were received from 202 landowners proposing to burn 108,408 acres of brush-covered land for livestock range and wildlife habitat improvement; 180 permits were issued for burning. These permittees conducted 137 controlled burns; 16 were cooperative burning projects including participation of two or more adjacent landowners. Regular fire control forces were available for standby during burning of 38,383 acres, on 45 separate burning projects this past season.

Activity in the brush range improvement program has continued at about the same level over the past



Activity in brush range improvement changed little in the last five years. The total acreage burned under permit in 1967 was about the same as the five-year average. Reburning reached a peak—some 57 per cent more than the preceding year.

five years. The number of burns was slightly down from 1966 but total acreage burned under permit was comparable to the current five year average. Since inception of the State's permit program in 1945 about 2.4 million acres of California brush lands have been burned; this acreage includes 0.6 million acres reburned to maintain a range forage cover. Reburning reached a peak during 1967 with 49,315 acres—76 per cent of the total acreage burned under permits—being treated.

Although most burning is conducted for improvement of livestock range, 17 of the 180 permits were issued for game management only, covering approxi-





Preparation is a most important part of a safe and effective controlled burning project. Firing crew burning in lines on the Mosley Burn in Santa Barbara County.

mately 1,800 acres. In addition, 16 controlled burns were conducted as dual-purpose burns for both domestic livestock grazing and wildlife habitat improvement during 1967.

Mechanical and chemical pre-treatment practices are being applied more and more as an important step in brush range land conversion. An estimated 8,160 acres were treated mechanically and 750 acres of standing brush were chemically sprayed prior to burning. Ranchers report that results have been excellent in all instances when burning followed this pre-treatment spraying of the standing brush.

Range improvement specialists provided assistance to landowners through individual contacts, group demonstrations, and distribution of printed material. These specialists answered over 400 requests, giving advice and assistance to landowners about brush range and hazard reduction practices—chemical sprout control, mechanical preparation, and seeding—used in combination with burning. They also accepted many requests to meet with local range improvement associations, to conduct or participate in range tours, and to speak on brush range improvement topics to ranchers and civic groups. In addition, these specialists conducted a program of brush hazard reduction on Division of Forestry fuelbreaks through the use of herbicides.

The cooperative range improvement field study program is conducted for the purpose of testing methods and demonstrating practices. Long term projects are undertaken in cooperation with landowners and agricultural specialists of other agencies. Findings from these studies are published from time to time in a series of Division publications entitled *Range Improvement Studies*, available for public distribution. The Division currently has four active projects. In addition, a number of smaller trial plots including seeding,

fertilization, and use of chemicals are being established by the range specialists for testing purposes each year. Information gained from these test trials is passed on to local land owners and others. The search for new methods and techniques in brush range improvement will continue through this field study program.

### Emergency Revegetation

The Cooperative Emergency Revegetation Program is authorized and conducted under Sections 4675–4677 of the Public Resources Code. The Program provides for the seeding of critically burned watershed lands to establish a temporary vegetative cover on areas that would not be restored by natural means in time to effectively prevent excessive runoff causing severe soil erosion, flooding, and sedimentation of downstream facilities detrimental to public health and welfare.

Emergency seeding activity during 1967 exceeded all previous years since the state's program started in 1956. Eleven major fires burned more than 141,400 acres of watershed land in southern California, most of which qualified for emergency treatment. Field examination determined that 111,557 acres required seeding under the cooperative emergency revegetation program. A total of 92,386 acres of private land and 565 acres of state-owned land received those emergency measures (table). An additional 18,606 acres of intermingled public lands received similar emergency treatment.

Emergency Revegetation Activity in 1967

Fire	Date	Area burned (acres)		Total	Private lands seeded (acres)
		Public lands	Private lands		
Kohler	Jun 9	280	6,964	7,244	6,733
Reche Canyon	Sept 20	—	2,686	2,686	2,500
Palmer	Oct 15	—	5,205	5,205	1,050
Turnbull II	Oct 15	—	1,720	1,720	1,720
Timber	Oct 16	1,950	9,500	11,450	9,500
Bailiff	Oct 29	8,848	14,981	23,829	11,207
Junction	Oct 29	—	640	640	640
Latigo	Oct 30	—	2,870	2,870	2,870
Paseo Grande	Oct 30	5,986	42,613	48,599	39,400
Pine Hill & Pole	Oct 30	2,218	4,947	7,165	2,740
Woodson	Oct 30	*1,575	28,425	30,000	*14,591
		20,857	120,551	141,408	92,951

\* Includes 565 acres of State-owned lands.

The Division of Forestry directed seeding of 91,327 acres of burned watershed included in five major fires in Riverside, Orange, and San Diego counties. Aerial seeding was accomplished by sowing either annual ryegrass (*Lolium multiflorum*) or wimmera ryegrass (*Lolium subulatum*) at the rate of eight pounds per



acre; the cost averaged approximately \$1.50 per acre. In addition, the U. S. Forest Service directed seeding of two major burns, including 13,950 acres of public and private lands, in Ventura and Riverside counties; Los Angeles County Fire Department contracted seeding of 6,280 acres in four major burns on private land in Los Angeles County.

The Division dispatched the range specialist from each of the northern districts to southern California to assist in evaluation of burned areas. This intensified effort proved successful; all burned lands were examined; areas meeting criteria for seeding were identified and delineated on maps within a week's time. With this assistance, personnel of the Southern California District were able to proceed rapidly and seed 97,607 acres by December 11, 1967. The remaining 13,950 acres were seeded by January 8, 1968.



Aerial seeding for emergency revegetation of the Woodson Burn, San Diego County. Operations being resumed at Ramona Air Attack Base after a light shower. Approximately 125,000 pounds of wimmera ryegrass were sown on 15,600 acres of private and public land, in a project directed by the Division of Forestry.



High intensity rains of the first major storm caused severe soil erosion along Highland Valley Road on the Woodson Burn, San Diego County. Two to three inches of rain fell within 48 hours. Emergency revegetation is intended to prevent this kind of damage, but in some years storms occur before the seeded grass has time to germinate and produce a protective plant cover.

Since this cooperative, cost-sharing emergency revegetation program began in 1956, 83 projects have been completed; some 310,125 acres of private lands have been seeded to provide a temporary protective grass cover. The average cost of the program to date has been approximately \$1.42 per acre, of which the state has paid about \$.71. The Emergency Revegetation Program is a costsharing program with the state paying up to 50 percent of the cost on private land, and other local or federal agencies, or private landowners paying the balance.

## FIRE PREVENTION EDUCATION

The objective of the Fire Prevention Education program is to coordinate fire prevention education and information activities of the Division of Forestry with those of other cooperating governmental agencies, industrial organizations, and citizens groups. Law enforcement activities, involving both civil and criminal cases, also are included in this program.

### Fire Prevention Activities

In 1967 four Fire Prevention Officers V were appointed at the Sacramento Headquarters, to head up the principle activities of the Fire Prevention Program. Due to an economy move in state government, the Fire Prevention Officer V position for Research was not established. Program development and administration of the entire Fire Prevention Program improved in 1967 despite the standstill in appointment of personnel to fill critically needed positions.

Fire starts in 1967 were about the same as the current five-year average notwithstanding the continued increase in California's population. Fires continue to occur in the areas protected by the California Division of Forestry at a rate of about 17 per 100,000 population, and are increasing at a rate of 138 fires per year. The ultimate goal is to reduce man-caused fires to six per 100,000 population.

Fire Prevention Handbooks, being prepared for use by field personnel, are designed to give detailed instructions on all phases of the fire prevention program. Portions of the handbook should be ready for distribution to the field by mid-year.

An attractive, modern display was prepared for the meeting of the National Association of State Foresters, held in Sacramento in October. This display caught the attention of the visiting State Foresters, producing a great deal of comment.



The Fire Prevention Program continued to emphasize cooperation with other agencies to secure the best possible results. Two of the organizations with which the Division worked in a constant effort to promote forest fire prevention are the Redwood Region Conservation Council and the Keep California Green, Inc., Committee.

The Redwood Region Conservation Council (RRCC) is a non-profit organization dedicated to Conservation Education and Fire Prevention in the North Coast area from Santa Rosa to Crescent City. Its elected officials are outstanding conservationists representing industries and businesses. These industries, and private citizens financially support the RRCC Programs and a small staff—headed by an Executive vice-president—with offices in Santa Rosa.

Keep California Green, Inc. (KCG) is primarily concerned with forest fire prevention via mass media outlets. Supported also by industry and private citizen pledges, KCG covers most of the State except the North Coast. With headquarters in Sacramento, KCG has elected officials and a permanent Secretary-Manager.

Both organizations work to prevent forest fires and cooperate very closely with the California Division of Forestry at Sacramento headquarters, district, and Ranger Unit Levels.

Other organizations, such as the California Women's Club, Junior Division, joined in the Fire Prevention effort by publishing a Conservation Handbook and setting a week in May aside as Forest Fire Prevention Week in California. The Southern California Edison and Pacific Telephone companies hosted the 1967 California Fire Prevention Committee meetings. Sniff 'N Snuff, two new Fire Prevention characters, were introduced to California citizens, in a new approach to Forest Fire Prevention.

### *Information and Education*

Meetings of the California Fire Prevention Committee were held in April. The Southern Section meeting was held in Los Angeles and the Northern Section in San Francisco. Topic of the meeting was discussion of new and better methods of disseminating fire prevention materials by business and industry. This organization of more than 400 members distributed large amounts of Fire Prevention material in 1967. Together, the Committee and Division personnel distributed eight million pieces of Fire Prevention literature during 1967. KRON-TV, Channel 4, was the Northern California plaque winner for outstanding Fire Prevention contribution as a member of the California Fire Prevention Committee. George Fox, President of Public Service Films, Inc., was the Southern California winner.

Sniff 'N Snuff, the Super Fire Safe Snoopers, two animated cartoon characters, were created and put to work in 1967 to help prevent forest fires. Sniff 'N Snuff, jointly created by the Division and Public Service Films, Inc., with help from the Hanna-Barbera Company, were designed to reach children, but have appeal with adults. These two characters were seen on TV and movie theatres throughout California urging that: children should not play with matches; the recreationist must be careful with fire; man can be the most dangerous animal in the forest; arsonists should be reported to the nearest fire agency. Additional Sniff 'N Snuff TV spots and theatre trailers were produced last year for use during the four most hazardous months in 1968. A 10-minute feature Sniff 'N Snuff film is being made; copies will be purchased for the film library. Sniff 'N Snuff were seen on 4' x 8' roadside signs during 1967.

The Division worked closely with the California Federation of Women's Clubs, Junior Membership, helping to prepare a section on Forest Fire Prevention in their Conservation Handbook. This section of the handbook stressed areas where Junior Women's Club Conservation Committees could work effectively to promote forest fire prevention. The Division will present an award to the Women's Club with the most achievements in a Forest Fire Prevention Program for children from kindergarten through sixth grade. This award will be presented at their State Convention.

A program of wildfire filming was begun in 1967, the objective being to obtain fire scenes which are shocking, and show human suffering and loss of property. The film will be edited and produced as one-minute TV spots, including sound commentary. One thousand feet of film was obtained last year; the program will be continued during 1968.

A committee of Division personnel, who normally handle public information activities, completed in rough draft detailed instructions for public and fire information duties. This portion of the Fire Prevention Handbook should be made available to Division personnel in 1968. Detailed instructions are also being written in other areas of the Information and Education Program.

Format and styling of the Division of Forestry *Newsletter* were changed, and will continue to be modified to disseminate information internally. An attempt was made to issue the *Newsletter* on a bi-monthly basis. Workload problems in 1967 prevented a bi-monthly issue; however, it is hoped that 1968 will solve some of the problems encountered in 1967.

"Cooperation" was the key word in our effort to work with associations and clubs in Conservation Education. A report was prepared and sent to the Citizens Conservation Education Committee together with



fire prevention materials and books. This Committee was appointed by the Governor in 1967 to study Conservation Education problems in California schools.

The Division cooperated with the Head Start Program of the Office of Economic Opportunity by teaching fire prevention to preschool, economically deprived children. This pilot project was established in the Riverside Ranger Unit where more than 1,000 Head Start children are receiving fire prevention instructions. A monthly fire prevention packet is sent to Head Start teachers, along with fire prevention films, to help teach fire prevention. Some results have been obtained but much more needs to be known about this age group. Fire prevention materials presently being used by the Division were found to be too advanced for pre-school children. New materials were developed; results of their use are not known at this time.

### Fire Prevention Engineering

Through encouragement and advice of Division of Forestry personnel the Western Pacific Railroad Company instituted a complete Fire Prevention Engineering Program to reduce fire occurrence along their rights-of-way.

Action by the company included four steps. Chemicals were used for clearing the right-of-way; in most areas the entire width of right-of-way was included, dead brush being removed by mechanical means and hand labor. Spark arresters were installed on *all* engines, including those for switchyard use. An engine maintenance program was established in which engine spark arresters were serviced and exhaust stacks scoured at least once each thirty days; scouring exhaust stacks was to prevent build-up of large carbon deposits which, when they do break loose, ignite fires in light fuels. Engineers were trained, from a fire prevention standpoint, on proper use of more electrodynamic braking to reduce use of the train's air brakes. The program was far-reaching; because of costs and for technical reasons it could not be completed in one year.

Through the over-all program, reduction of fires in the Sierra Cascade District can be appreciated by comparing total railroad fires for recent years.

Year	Number of fires
1964 .....	More than 100
1965 .....	Less than 65
1966 .....	42
1967 .....	6

Working with Southern Pacific Railroad Company and Fibreboard Corporation, California's largest user of wood chips, an agreement was reached to use nets to cover all freight cars carrying wood chips within the state. This will greatly reduce accumulation of

wood chips along rights-of-way which has led to easy ignition of wildfires. The expense of nets and fasteners is being shared by the two companies.

A new Roadside Hazard Reduction Guide was completed, in cooperation with the United States Forest Service, Region 5. The California Division of Highways reviewed the guide while it was being written, making several suggestions for improvement and offering some of their official correspondence for inclusion.

Electrical utility companies continue to make good progress on right-of-way maintenance. Continuing at their present pace, by the 1969 fire season they should reduce fires caused by powerlines coming into contact with trees or limbs.

### Law Enforcement

Significant progress in coordinated investigations with cooperating and contracting agencies were attained this past year. A high number of investigations were conducted by the Division at the request of cities and adjacent fire and law enforcement agencies. Requests included industrial and commercial fires which caused major loss, along with watershed fires. It became apparent that a significant number of persons responsible for city and urban fires were also responsible for fires in the Division's responsibility area.

Division investigation teams were requested by Ventura County during the rash of major fires which occurred the last part of October. Each of the four teams consisted of two Division investigators and one Ventura County Fire Inspector. These teams conducted 42 separate investigations in a little over a week's time, establishing the causes on all but two of the fires. Of these fires, five were major watershed fires burning over 70,000 acres, resulting in the loss of hundreds of thousands of dollars in homes and improvements. Fire investigators found themselves deeply involved with suspects who were also involved in narcotics, burglary, and grand theft; and a number of homosexuals. This information was turned over to local law enforcement agencies; it helped expedite apprehension of these people not only for fire violations but for other crimes as well.

Additional use was made of investigation teams in southern California in early November during the siege of watershed fires. The cause, and parties responsible were determined in all but one of the major fires. There were 225 fires during this period, with six major fires burning over 112,000 acres and causing about six million dollars' worth of damage. Fires investigated by these teams burned some 113 structures, resulted in flood damage to 200 others, and utilized over 4,200 men from all agencies.



Many benefits resulted from use of Division investigation teams. Fire scenes could be evaluated quickly, while evidence was still fresh; more concentrated effort could be made on each fire; and a show of force made people involved in the fire realize that a major effort was being expended to determine the fire's cause and persons responsible. All of this encouraged local fire and law enforcement agencies to greater effort, and renewed interest in catching one of the most difficult types of criminals to apprehend and convict—the "fire setter."

Joint fire investigations were made with utility companies where these companies were responsible. Both parties benefited because all evidence and facts were evaluated and agreed upon by the investigators. This paved the way for a better evaluation of any liabilities or non-liabilities that existed, ultimately resulting in settling claims and minimizing costly law suits.

During 1967, 287 Division of Forestry personnel were students in the statewide Peace Officer Training Program. Seventy-four students completed the Basic Training. One hundred thirteen students completed two-thirds of the Basic Training; and 81 students completed one-third. Nineteen administrators completed Administrative Peace Officer Training.

The majority of the training was presented by the Fire Prevention and Law Enforcement Training Officer, assisted by specialists from the State Forester's Fire Prevention Section staff. In specific fields, various District staff members contributed materially to the program. The Federal Bureau of Investigation (FBI),

State Department of Justice (CII), Highway Patrol, State Law Library, and Attorney General's Office regularly furnished highly-trained specialists to instruct within their field. In addition, various sheriffs and district attorneys cooperated in the training. The Highway Patrol pistol range and the State Law Library were also made available for class use.

Since the Division of Forestry Fire Academy opened, the Peace Officer Training Course has been conducted at that location.

#### Plans for 1968

Research will be continued, if funds are made available, to attempt to establish answers to some Fire Prevention problems. The Fire Prevention Research Committee will determine areas where research is needed the most.

Present research information on children and matches will continue to be tested with Head Start children in 1968.

Evaluation of fire prevention material will continue, with efforts made to improve its effectiveness when used with school children and others.

Fewer 4 x 8-foot roadside signs will be distributed; emphasis will be placed on improving their quality.

The Handbooks on Fire Prevention Information and Education, Fire Prevention Engineering, and Law Enforcement should be available to field personnel in 1968, containing detailed instruction for each phase of the program.

### MANAGEMENT SERVICES

The objective of the Management Services Program is to assist with effective planning, organizing, and managing of activities of the Division of Forestry under existing laws and regulations. Management Services supports all other Division programs in reaching their individual objectives.

#### Managerial Processes and Budget Planning

The Management Services Section works with other staff sections to assist in developing plans for management of the Division, and in carrying out managerial

processes. Primary responsibilities are to collect data and make analyses; identify and estimate program costs and direct the budget planning function; and to provide support and assistance in attaining maximum utilization of manpower and resources. Management Services also is responsible for assistance and guidance in functions of purchasing and storing equipment and supplies; management of records; and property management.

The Division of Forestry budget for the fiscal year 1967-68 (July 1, 1967-June 30, 1968) is summarized below by object of expenditure.

#### DIVISION OF FORESTRY BUDGET—Fiscal Year 1967-68

(1) GENERAL SUPPORT (Excluding Emergency Fire)	\$29,423,020
(2) FOR OTHER AGENCIES (Protecting State and Private State-Responsibility Land)	3,848,397
(3) EMERGENCY FIRE FUND	1,515,000
(4) BLISTER RUST CONTROL	40,000
(5) INSECT CONTROL	20,500
(6) FOREST AND FIRE RESEARCH	275,302
(7) TOTAL ABOVE	\$35,122,219
(8) CAPITAL OUTLAY	\$1,973,000



### Explanation of above budget:

(1) The Support Budget for the Division of Forestry is approximately \$521,000 less than the 1966-67 fiscal year level. This represents a net condition after recognition of a 4.9 percent salary increase, approval of \$1,035,000 for workload augmentations, and an overall reduction of 10 percent as a result of the anticipated shortage in the General Fund. Set forth below are the significant changes by program:

#### *Fire Protection Program*

(a) Equipment .....	-\$1,098,000
(b) Cooks reduced to one per Ranger Unit .....	-472,000
(c) Air Attack (\$400,000 approved as a workload item, but the program was reduced \$178,000 because of shortage in the General Fund) .....	222,000
(d) Termo Forest Fire Station .....	-33,000
(e) Forestry Equipment Operators reduced 10 percent .....	-132,000
(f) Alturas Bulldozer Crew .....	-21,000
(g) Alturas Station from No. 3 to No. 1 .....	-13,000
(h) 5 Lookouts (Bolero, Gilman, Little Mt., Chalks, Mathison) .....	-25,000
(i) Contract Counties—Kern (Cook Reduction) .....	-18,000
(j) Arbitrary Operating Expense Reduction .....	-97,000

#### *Forest, Range, and Watershed Management*

(a) 2 Forester II (Parlin Fork and Service Forester in District II) .....	-23,000
(b) White Pine Blister Rust .....	-25,000
(c) Forest and Fire Research:	
Gall Rust Control .....	-6,800
Forest Regeneration .....	-6,500
Effectiveness of Seed Trees for Natural Regeneration .....	-17,700
Forest Growth Prediction .....	-15,600
Hardwood Utilization .....	-7,100
(d) Watershed Research—San Dimas Project .....	-23,400
(e) Arbitrary Operating Expense Reduction .....	-10,000

#### *Conservation Camps*

(a) 1 Foreman II (Iron Mine Crew to Davis) .....	-11,000
(b) 3 CYA Spike Camps .....	-112,000
(c) 3 Mobile Camps .....	-260,000
(d) Murietta .....	-151,000
(e) Folsom-Beaver .....	-99,000
(f) Minnewawa .....	-124,000
(g) Inmate Pay Plan .....	-94,000
(h) Arbitrary Operating Expense Reduction .....	-12,000

#### *Administration Program*

(a) 1.5 Intermediate Clerical Positions—	
Sacramento .....	-9,000
(b) 1 Intermediate Stenographer—District V .....	-6,000
(c) 3 Carpenters .....	-38,000
(d) 4 Assistant Civil Engineers .....	-57,000
(e) 4 Heavy Equipment Mechanics .....	-43,000
(f) 12 Field and Graduate Trainees .....	-106,000
(g) Arbitrary Operating Expense Reduction .....	-52,000

In addition to the above reductions, \$809,000 was deleted from the Division's budget by the Department of Finance prior to completing the Governor's budget. The reduction consisted of \$509,000 required to fund the Fire Prevention implementation; and \$300,000 to fund activation of the Bautista and Ortega Conservation Camps.

(2) Allotment of funds to other agencies for protection of state and private land for which the Division is responsible increased only \$47,000. This was a net condition after applying recognized salary increases and reduction to keep this service on a parity with similar lands protected by the State.

(3) Emergency Fire Fund is a basic appropriation of \$200,000. The need has exceeded \$2,000,000 in an extremely bad

fire year. Augmentation from the so-called Governor's Emergency Fund is requested when need arises. Anticipated 1967-68 expenditure is \$1,515,000.

(4) State allotment paid to U.S. Forest Service in matching expenditure for field projects was reduced \$30,000. After re-evaluation of Blister Rust program, it was determined that work could be confined to prime lands growing sugar pine and that \$30,000 could be utilized in covering a portion of the General Fund shortage without seriously hampering the planned program.

(5) Allotment fluctuates, based on anticipated need for control projects in areas of serious infestation.

(6) Funds for Forest and Fire Research were reduced approximately \$64,000. This reduction can be attributed to the overall General Fund condition of the State.

(7) Totals set forth represent the net budget of the Division. Gross budget approximately \$43,409,000, reimbursed by the following:

- (a) From the U.S. Government in support of the Oak Glen Job Corps Conservation Center, \$951,000 (does not include Capital Outlay).
- (b) Rural-Structural Fire Protection \$5,357,000 (contracts with counties and fire districts).
- (c) From U.S. Department of the Interior: Fire Protection of 3.6 million acres of scattered public domain lands, \$497,000.
- (d) Other reimbursements: Collections for services to employees; rentals to other agencies; services to other agencies, and so forth, \$1,482,000.

(8) Capital Outlay funds total \$1,973,000. Of this amount, \$1,573,000 represents the unexpended balance from prior year appropriations. A budget of \$4,371,000 was proposed for the 1967-68 fiscal year, but because of the General Fund Condition, the proposed construction program was reduced to a \$400,000 level. In addition to the above reductions, a portion of the funds previously appropriated under Capital Outlay (\$2,330,000 for Tamarack, Bautista, and Ortega Conservation Camps) has been identified for reversion as of June 30, 1968.

### *Manpower Utilization and Personnel Management*

During 1967 there were 309 new permanent appointments to fill vacant positions in the Division. As of December 31, 1967, there were 2,567 year-long employees, and at the peak of fire season total employment reached 4,299, including seasonal drivers and firefighters.

Due to budget reductions, the Division of Forestry's recruitment program for graduate foresters was temporarily suspended. This eliminated twelve Forestry Graduate Trainee positions and six Forestry Field Trainee positions which are normally filled by recent forestry school graduates and high potential career employees from the Foreman class. However, a number of trainees promoted to Junior Foresters, together with existing Junior Foresters, provided a substantial backlog for promotion into the Assistant State Forest Ranger, Forester I, and Fire Prevention Officer II classes.

Twenty Division employees retired during the year; eight for disability reasons. Among the retirees were two Rangers with long careers with the Division. Wilfred W. Skinner, State Forester Ranger III, retired from San Bernardino after 32 years of service;



Curtis E. Lindley, State Forest Ranger I, retired from Bishop after 33 years of service. Gunnar E. Forssbeck, Assistant Civil Engineer, retired from Sacramento Headquarters after 22 years of service.

The other retirees were:

Henry C. Creed, Assistant State Forest Ranger, San Luis Obispo

Florence D. Prince, Intermediate Stenographer, Perris

Roy L. Tulene, Assistant State Forest Ranger, Fresno

Vester L. Lowder, Forestry Foreman I, Glen Ellen  
Aleta E. Johnson, Intermediate Stenographer, Monte Vista

William J. Webb, Carpenter Foreman, Fresno

Charles Swartz, Assistant State Forest Ranger, Hollister

Frances Skewes, Senior Stenographer, Sacramento

Vivien Wood Watson, Accountant I, Sacramento

Evan W. Thomas, Forestry Foreman II, Washington Ridge

Aleta J. Bristow, Senior Typist-clerk, Fresno

Donald T. Bennetts, Storekeeper II, Sacramento

Edgar R. Cramer, Forestry Cook II, Nevada City

Louis Celeri, Forestry Cook I, Fortuna

Clifford L. Cochran, Forestry Foreman II, Fort Jones

Martin E. Wissler, Forest Firefighter (s), Orange Headquarters

Oliver S. Duckworth, Forestry Equipment Operator, King City

Thirty-two employees were given their 25-year awards. Thirteen employees received Merit Awards.

During the year, significant progress was made in revising time reporting procedures and policies for the fire suppression classes. This so-called "TR-96 Project" has identified, and is in the process of finding solutions for problems of employees in the civil service classes covered by the 96-hour duty week. Division management has worked closely with employee organizations in this effort to improve personnel policies and procedures; most active were the California Division of Forestry Employees Association and California State Employees Association.

## ENGINEERING AND CONSERVATION CAMPS

The Engineering and Conservation Camps program serves a dual function. Responsibilities of Engineering and Construction are primarily to establish standards for engineering and construction activities of the Division: they include land acquisition; surveys, mapping, and delineation; and design, construction, and maintenance of facilities.

The Conservation Camp Program is interdepartmental (between the Departments of Conservation, Youth Authority, and Corrections) to provide a beneficial environment and living-working experience conducive to rehabilitation of inmates and wards assigned to Conservation Camps, and an essential trained force for firefighting and other resource conservation work.

### *Engineering and Construction*

There were several interesting highlights in construction activity in 1967.

The Division of Forestry occupied two new conservation camps. The Eel River Conservation Camp, in Humboldt County, began operations on February 1; and on June 1, the Growlersburg Camp in El Dorado County was occupied.

Completion and occupancy of three ranger unit headquarters facilities marked culmination of long-range plans and objectives pursued for many years. The new Placer Ranger Unit Headquarters, near Auburn, replaces facilities which will be covered by waters of Auburn Reservoir when that project is finished. The new San Diego Ranger Unit Headquar-

ters at Monte Vista takes the place of the old leased quarters in the center of the City of La Mesa. The new Tulare Ranger Unit Headquarters, located several miles out of the City of Visalia, replaces old facilities within the city that were much too small and difficult of access.

Completion and occupancy of the California Division of Forestry Fire Academy, near Ione in Amador County, represents achievement of another long-sought objective—adequate facilities for training employees of the Division.

Phase II construction—consisting of an office addition, a gymnasium building, and a 50-man barracks—was completed at the Oak Glen Job Corps Conservation Center.

In addition to the major projects outlined above, some eighteen miscellaneous construction projects were completed. Normal additions were made to pre-suppression facilities, mainly 10,000-gallon concrete water tanks; and nearly 50 miles of truck trails were completed.

The Maps and Graphics group completed revision of administrative maps for five ranger units. Exhibits for several court cases were prepared; and numerous fire prevention designs, certificates, training aids, and miscellaneous charts were made.

Six new sites were acquired in fee simple for Division of Forestry purposes, including three for conservation camps—Ben Lomond, Magalia, and Minnewawa (the new site for the Minnewawa Camp is located in Bratton Valley). Easements for 216 rights of way were



processed during the year, which is about the normal level of activity. Basic criteria have been developed as guidelines for site selection.

The format for budgeting capital outlay construction has been completely modified. New forms released to the field will be used in presenting the 1969-70 capital outlay budget request.

### Conservation Camp Program

During 1967, use of nine facilities was terminated, and two new ones were activated. The camps which were closed included Minnewawa, Murietta, and Folsom-Beaver Creek; three mobile camps; and three youth conservation spike camps. The two new installations were Eel River in Humboldt County—100 inmates; and Growlersburg in El Dorado County, which is an 80-man camp. One camp name change, from Cuyamaca to La Cima, was made in San Diego County.

At the close of 1967, there were 33 conservation camps in full operation. A total of 2,680 wards and inmates were housed at these locations in a rural out-of-doors environment; this is about 200 less than the population at the end of 1966.

#### Conservation Camp Statistics for 1967

Active Camps	Type	Population
29	Adult Inmates .....	2,380
4	Youth Authority Wards .....	300
Total Population .....		2,680

Distribution of the 33 conservation camps among the six Administrative Districts is as follows: Seven camps each in the North Coast and Southern California Districts; six camps each in the Sierra-Cascade and Central Sierra Districts; four in the San Joaquin District; and three in the Central Coast.



Inmates from Mountain Home Conservation Camp assisted the Department of Fish and Game in control of a botulism outbreak at Tulare Lake in November. Over 13,000 ducks were treated and saved.

The task of replacing two youth conservation camps was begun. All old structures have been removed and sites were prepared for new buildings. Several trailer units from the mobile camps, which were deactivated in 1967, were moved to Ben Lomond and Pine Grove, where they are being utilized by wards during the period of construction. Erection of new buildings at Ben Lomond was started in 1967, while construction is expected to begin at the Pine Grove site during the early part of 1968.

A total of 6,721,712 man hours was worked by inmates and wards assigned to conservation camps. Forest fire suppression activities accounted for 7.58 percent of the total. A small but significant number of man hours (5,296) was spent on search and rescue operations. The useful work of the 2,680 wards and inmates was spent in fifteen activities (table).

#### Work Performed by Conservation Camps During 1967

Activity	Man Days	Percent of Total
Fire Suppression .....	63,673	7.58
Camp Services .....	221,440	26.36
Tool and Transportation Maintenance .....	23,954	2.85
Hazard Reduction .....	80,275	9.55
Fuelbreak Construction and Maintenance .....	134,657	16.03
Truck Trail Construction and Maintenance .....	52,546	6.25
Forestry Utility Systems Maintenance and Development .....	62,163	7.40
In-Camp Projects .....	47,421	5.65
Nursery Work, Planting and Forest Demonstration .....	9,575	1.14
Forest Insect and Disease Control .....	6,355	.75
Public Campground and Recreational Development .....	39,121	4.66
Game and Fish Habitat Improvement .....	12,879	1.53
Training .....	14,641	1.74
Search and Rescue .....	662	.08
Miscellaneous Conservation Projects .....	70,852	8.43
Totals .....	840,214	100.00

Planning for future changes in the Conservation Camp Program continues. Five camp sites are in various phases of preparation so inmate and ward capacity can be expanded soon after the need arises and funds become available.

### Oak Glen Job Corps Conservation Center

The Oak Glen Camp in Riverside County continued as a Job Corps Conservation Center during 1967. This camp is operated under provisions of a contract between the State of California and the U.S. Office of Economic Opportunity (OEO).

In general, the contract calls for the Division of Forestry to operate Oak Glen as a Job Corps Conservation Center with full reimbursement of costs to the State provided by OEO. The contract was first signed in June 1965, and has been amended each year to



provide for operations through June 30, 1968. Present plans are for another contract amendment to provide for another fiscal year of operation.

The major change in this program during 1967 was an increase in camp capacity from 120 to 170 enrollees. Construction necessary for this increased capacity continued through the year with a new 50-man barracks, a gymnasium, and an office extension being completed.

The staff increase necessary for the larger enrollee population also continued throughout the year. Present staffing pattern consists of 52 positions and includes specialized personnel in education, counseling, vocational training, medical technology, recreation, and corpsman supervision. The specialized nature of these positions has caused a series of problems in classification, recruitment, and hiring. By the end of 1967, however, all positions except one, were filled.

At the same time the staffing problems were being overcome, an extensive staff training program was being carried on. This training covered both general and specialized subjects concerning basic forest fire and safety training for new employees, and specialized instruction in techniques involved in working constructively with a problem population in a free camp society.

The basic objective of the Job Corps is to teach disadvantaged youth attitudes and basic skills which they need to function in a normal society. Corpsmen are recruited under Federal standards from all over the United States. They receive intensive training while in the Job Corps, including basic and remedial educa-

tion, counseling, introductory vocational training, and basic work habit development while performing conservation work.

All physically fit enrollees receive basic fire and safety training; crews of corpsmen under supervision of Forestry Foremen have made a good record on forest fires in the southern and central areas of the State. Conservation work is still recognized as one of the major factors in development of the corpsman's sense of accomplishment, self-pride, and working ability.

### Neighborhood Youth Corps

This program of the U.S. Department of Labor is designed to help unemployed youth gain job experience, and develop work habits and attitudes necessary for regular employment.

The Division of Forestry participated by identifying needed jobs which could be done by some of these youth, and providing on-the-job supervision and training for them. Screening and referral of youth to the Division of Forestry for these jobs is done by the Department of Employment or by other sponsoring non-profit groups such as Youth Opportunity Centers.

During 1967, fifty-one jobs were identified in nine Forestry units and referrals were made by sponsoring groups which resulted in these jobs being filled for various lengths of time. The jobs themselves ranged from clerical work for young women to auto shop helpers, groundsman, and general work for young men.

## PUBLICATIONS OF 1967

Activities of the Division, and results of research, were reported in a variety of publications in 1967. Those issued during 1967, prepared by or in cooperation with the Resources Agency are listed below. They are related directly to work of the Division of Forestry.

### Papers and Reports Processed by Division and Department

- "Reforestation Studies—1966," by Ronald S. Adams. 21 pp.
- "Artificial Protection of Natural First Year White Fir Increases Survival," by Ronald J. Cecchetti. State Forest Note No. 32, 7 pp.
- "Production of California Timber Operators in 1965," by Daniel Dotta. State Forest Note No. 31, 6 pp.
- "California Cone Crop for 1967," by C. J. Eden. State Forest Note No. 33, 7 pp.
- "Forest Nurseries—1966-67," by C. J. Eden. 9 pp.
- "California's 1966 Fire Weather Severity," by Rex J. Hess and William Innes. California Fire Control Notes No. 15, 11 pp.
- "Annual Forest Practice Report—1966." 6 pp.
- "Annual Report of Forest Fire Research, 1966-67." California Fire Control Notes No. 16, 11 pp.

- "Brushland Range Improvement—1966." 20 pp.
- "California State Forests—1966." 13 pp.
- "Emergency Revegetation of Burned Watersheds—1966." 8 pp.
- "The State Forester's 1966 Report." 26 pp.

### Publications Resulting from Cooperative Effort of Division

- "Soils on West Side of Cascade Range in Northern California," by E. B. Alexander and W. L. Colwell, Jr. An abstract of paper in *Programs and Abstracts*, Society of Soil Science, June 19-27, 1967.
- "Preservation and Augmentation of Insect Predators of Western Pine Beetle," by A. A. Berryman, *Journal of Forestry*, April 1967.
- "Estimation of *Dendroctonus brevicomis* (Coleoptera: Scolytidae) Mortality Caused by Insect Predators," by Alan A. Berryman. *Canadian Entomologist* 99: 1009-1014, October 1967.
- "Factors Influencing the Response of *Ips confusus* (Le Conte) (Coleoptera: Scolytidae) to Male Attractants," by J. H. Borden. *Canadian Entomologist* 99: 1164-1193, November 1967.
- "Emergence Patterns of *Ips confusus* (Le Conte) (Coleoptera: Scolytidae) from Ponderosa Pine," by E. A. Cameron



- and J. H. Borden. *Canadian Entomologist* 99: 236-244, March 1967.
- "Fighting Fire with Air," by Dean L. Dibble and James B. Davis. U. S. Forest Service, *Fire Control Notes* 28(1), January 1967.
- "Soil Wettability and Wetting Agents—Our Current Knowledge of the Problem," by L. F. DeBano, J. F. Osborn, J. S. Krammes, and J. Letey, Jr. Pacific Southwest Forest and Range Experiment Station (U. S. Forest Service Res. Paper PSW-43), 1967. 13 pp., illus.
- "California White Oak Log Grades and Lumber Yield," by William A. Dost, Fred E. Dickinson, and Dean R. Prestemon. California Forestry and Forest Products No. 45, December 1966.
- "Numerical Analysis of Convective Motions Over a Mountain Ridge," by Michael A. Fosberg. *Journal of Applied Meteorology*, October 1967.
- "Olfaction in Seed Detection by Deer Mice," by Walter E. Howard and Ronald E. Cole. *Journal of Mammology*, February 1967.
- "An Appraisal of Conditions Affecting Forest Trees in the Tahoe Basin," by Richard H. Hunt, Rodney E. Joost, John R. Pierce, and Alfred C. Tegehoff. California Division of Forestry. 17 pp.
- "A New Species of *Cercomegistus* (Acari: Megostigmata) from California," by D. N. Kinn. *Acarologia*, Vol. 3, 1967.
- "Estimation of Stand Volumes of Young-growth Ponderosa Pine," by James L. Lindquist. California Forestry and Forest Products No. 46. June 1967.
- "Landscape for Fire Protection," by Richard G. Maire and J. R. Goodin. Univ. of Calif. Agr. Extension Service, Bulletin AXT-254. 15 pp.
- "Laboratory Tests on the Effectiveness of Prolin Mouse Tubes," by Rex E. Marsh, Ronald E. Cole, and Walter E. Howard. *Journal of Wildlife Management*, April 1967.
- "Fuelbreaks—Effective Aids, Not Cure-alls," by James L. Murphy, Lisle R. Green, and Jay R. Bentley. U. S. Forest Service, *Fire Control Notes* 28(1), January 1967.
- "Sea Breeze Effects on Forest Fire Behavior in Central Coastal California," by Clinton B. Phillips and Mark J. Schroeder. California Fire Control Notes No. 14. 26 pp.
- "Brushkiller to Control Scrub Oak Sprouts—Combinations of Broadcast and Individual Plants Tested," by T. R. Plumb. U. S. Forest Service Research Note PSW-146. 6 pp.
- "The Biology and Pathology of Dwarfmistletoe, *Arceuthobium campylopodum* f. *abietinum*, Parasitizing True Firs in California," by R. F. Sharpf and J. R. Parmeter, Jr. U.S.D.A. Technical Bulletin No. 1362, January 1967. 42 pp.
- "Methodology for Isolation and Identification of Insect Pheromones with Reference to Studies on *Ips confusus*," by R. M. Silverstein, J. O. Rodin, and D. L. Wood. *Journal of Economic Entomology*, August 1967.
- "Fuelbreaks in Southern California, 1958-1965," by Verdie E. White and Lisle R. Green. U. S. Forest Service, Pacific Southwest Forest and Range Experiment Station. 33 pp.
- "Unique Synergistic Effects Produced by the Principal Sex Attractant Compound of *Ips confusus* (Le Conte) (Coleoptera: Scolytidae)," by D. L. Wood, R. W. Stark, R. M. Silverstein, and J. O. Rodin. *Nature* 215: 206, July 1967.
- "Forest Pest Conditions in California—1966," by California Forest Pest Control Action Council. Office of State Printing. 21 pp.
- "A Report on Forests, Pests, and Pesticides," by California Forest Pest Control Action Council. California Division of Forestry. 34 pp.
- "Chemicals for Forest Fire Fighting," by National Fire Protection Association. Second edition, 1967. 112 pp.

#### Printed Articles and Books (by Division Personnel)

- "Phytoactin Does Not Improve Survival of Stored Monterey Pine and Douglas-fir Seedlings," by Ronald S. Adams, Samuel F. Gossard, and John R. Ritchey. U.S.F.S., *Tree Planters' Notes* 8(4): 8-10, November 1967.
- "McNab Cypress in Northern California: A Geographic Review," by J. R. Griffin and C. O. Stone. *Madroño*, January 1967.
- "Brush Range Improvement—A Report of the Cooperative Backbone Project," by Walter H. Johnson and William Harrington. Univ. of Calif. Agric. Extension Service and State of California, Resources Agency, Division of Forestry. July 1967.
- "Forest Practice Rules for North Sierra Pine Forest District." 1967 edition. Revised by Forest and Range Management Section. Office of State Printing. 51 pp.
- "Forest Practice Rules for Redwood Forest District." 1967 edition. Revised by Forest and Range Management Section. Office of State Printing. 52 pp.

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